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THE GAS MANAGER'S HANDBOOK

BY

THOMAS NEWBIGGING, A.I.C.E.

THE

GAS MANAGER'S HANDBOOK;

CONSISTING OF

TABLES, RULES, AND USEFUL INFORMATION

FOR

GAS ENGINEERS, MANAGERS,

AND OTHERS ENGAGED IN THE

MANUFACTURE AND DISTRIBUTION

OF

COAL GAS.

BIBLIOTHECA·BODLEIANA

BY

THOMAS NEWBIGGING, A.I.C.E.

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PREFACE.

THE present work has been compiled to supply a want which has long been felt by Gas Managers. Though there are several well-known, excellent, and comprehensive treatises on Gas Lighting, and on the Chemistry of Gas Manufacture, and many valuable manuals bearing on particular branches of the subject, no Handbook has yet appeared embodying in a convenient form the various Rules, Tables, and other data so frequently required for reference in successfully conducting the operations of gas-works.

It is not possible, nor is it desirable, that a work of this kind should consist of entirely original matter. To be really useful it must bring together, in systematic order, whatever of value it can glean, not only from the few standard treatises on the subject, but also from the Periodical Literature of Gas Lighting, and the numerous pamphlets and other publications constituting the Library of the Gas Engineer. At the same time, a cursory glance at the contents of the volume will show that there is much original matter of an acceptable kind distributed throughout its pages.

My very grateful acknowledgments are due to Mr. T. G. Barlow, C.E., for his kindness in so readily and courteously permitting me to extract from the earlier volumes of the *Journal of Gas Lighting* his comprehensive and valuable Tables on the Flow of Gas through Mains; and those of Mr. Lewis Thompson, giving the results of the analyses of different varieties of Coal and Cannel. I am also indebted to Mr. Hartley, of

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HANDBOOK
FOR
GAS ENGINEERS AND MANAGERS.

COAL AND CANNEL.

The particulars contained in the following Tables, showing the Producing Power of various kinds of Coal and Cannel, have been derived from the standard works on Gas Lighting, from parliamentary returns, and from the recorded results of the different experimentalists, in whatever authentic form they may have appeared. There are evident discrepancies between some of the results, especially between the earliest and the most recent. The range of time, however, over which the several experiments have been made, embraces a period of about forty years, and it is doubtless to the imperfect apparatus used in the earlier trials that the difference between these and the later results may chiefly be attributed. In some instances the difference is only apparent, the distillatory process having been prolonged at the expense of the illuminating power.

It is exceedingly desirable in recording the results of experiments with mixtures of various Coals with each other, and along with other substances, that the exact proportions used should be stated. When these are not specified the other particulars given are comparatively valueless. The worth of some of the information contained in the subjoined Tables would have been much enhanced had this necessary rule been followed.

The weight of the coke produced in the different trials should also be given in every instance. The absence of such information, so easily obtained, and of such obvious value, is always to be regretted.

COAL AND CANNEL.

Quantity of Gas obtained from Coal and Cannel per Ton; Illuminating Power and Specific Gravity of the Gas; Weight of Coke in Pounds per Ton; and Per-Centage of Ash in Coke.

Name of Coal.	Cubic Feet of Gas Obtained per Ton.	Illumin. Power of Gas in Stand. Sperm Candles.	Specific Grav. of the Gas. Air, 1·000.	Weight of Coke in lbs. per Ton.	Ash in Coke per Cent.	Authority.
CANNEL COAL.						
Arniston	12,600	22·5	·626	1221*	7·66*	Chartered Gas Co.
Ditto	10,640	..	·637	..	..	Dr. Fyfe.
Boghead	13,334	45·	..	717	..	Mr. T. G. Barlow.
Ditto	15,000	87·75	·752	708*	70·25*	Chartered Gas Co.
Ditto	15,486	52·	·726	760	63·95	Dr. Fyfe.
Bridgewater	11,200	..	..	..	..	Mr. J. Leigh.
Brymbo	6,650	20·	·504			
Cannel	10,000	26·	..	..	..	Chartered Gas Co.
Capeldrae	14,400	19·75	·577	1019*	23·07*	Ditto.
Ditto, No. 1	11,500	41·56	·644	999	17·26	Dr. Fyfe.
Ditto, No. 2	9,600	50·	·650	1256	43·7	Ditto.
Coed Talon, shale	10,780	14·07	..	nil.	..	Mr. Paterson.
Ditto, smooth variety	10,800	22·67	..	1344	69·	Ditto.
Ditto, curly variety	13,600	27·75	..	903	68·7	Ditto.
Donibristle	9,923	87·55	·593	1220	7·85	Dr. Fyfe.
Dunkirk, Dukinfield	10,875	22·75	..	1568	8·	Mr. Longworth.
Edge Green, Wigan Dist.	10,540	19·63	..	1348	7·83	Mr. Paterson.
Fir Tree, do.	11,900	15·75	..	1210	13·7	Ditto.
Haywood, Scotch	11,400	30·22	..	1157	17·8	Mr. F. J. Evans.
Hindley Field	12,890	23·25	..	1053	7·4	Mr. Paterson.
Kirkness	12,800	21·20	·562	896*	83·7*	Chartered Gas Co.
Ditto	9,620	..	·711	..	..	Dr. Fyfe.
Knightswood	9,720	..	·590	..	..	Mr. Wright.
Ditto	12,200	19·	·550	1154*	4·66*	Chartered Gas Co.
Ditto	8,960	..	·557	..	..	Dr. Fyfe.
Lawton, Stoke-upon-Trent	8,000	22·	..	..	72·	Mr. Paterson.
Lesmahago, No. 1 cannel	13,500	27·10	·642	1129*	18·05	Chartered Gas Co.
Ditto, No. 2 do.	13,200	24·80	·618	..	..	Ditto.
Ditto	10,176	44·12	·669	1360	6·58	Dr. Fyfe.
Ditto, 1st experiment	11,681	..	·540	..	..	Mr. Wright.
Ditto, 2nd do.	9,878	..	·650	..	..	Ditto.
Ditto	11,312	..	·737	..	..	Mr. J. Hedley.
Leverson	11,600	18·	·523	1550*	13·67*	Chartered Gas Co.
Lochgelly	9,123	..	·567	1490*	29·7*	Dr. Fyfe.
Lothian	10,000	..	·556	..	..	Ditto.
Monkland	10,190	..	·667	..	..	Ditto.
New Brunswick	..	..	..	755	1·78	Mr. L. Thompson.
Peasley Cross, St. Helen's	10,000	19·46	..	..	4·25	Mr. King.
Pelton	11,500	18·5	·520	1534*	13·7*	Mr. J. Hedley.
Ramsey	10,300	21·4	·548	..	..	Chartered Gas Co.
Ramsey's Newcastle	9,746	..	·554 to ·580	..	..	Dr. Fyfe.
Ditto	9,692	16·65	·625	1520	..	Ditto.
Ditto	9,016	..	·604	..	..	Mr. Wright.
Ditto	9,333	..	·598	..	..	Mr. Kay, Dundee Gas Co.
Ditto	9,667	..	·731	..	..	Dr. Leeson, Dr. Miller, &c.

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* Mr. L. Thompson.

Name of Coal.	Cubic Feet of Gas Obtained per Ton.	Illumin. Power of Gas in Stand. Sperm Candles.	Specific Grav. of the Gas. Air, 1·000.	Weight of Coke in lbs. per Ton.	Ash in Coke per Cent.	Authority.
CANNEL—*continued.*						
Ramsey's Newcastle	9,151	27·2	..	1416	10·44	Mr. L. Thompson.
Scotch Parrot	9,500	..	·640	..	..	Dr. Fyfe.
Scotch	14,000	..	·580	..	..	Mr. Clegg.
Ditto	13,813	..	·500	..	..	Ditto.
Staffordshire	..	..	..	1120	5·8	Mr. L. Thompson.
Torryburn	11,200	..	·624	..	..	Dr. Fyfe.
Washington	10,500	18·	·500	1626*	12·9*	Mr. J. Hedley.
Welsh	11,424	..	·737	..	..	Ditto.
Wemyss	10,976	..	·670	..	..	Mr. Wright.
Ditto	10,192	..	·691	..	..	Ditto.
Ditto	14,300	24·5	·580	1064*	31·78*	Mr. Evans, Chartered Co.
Ditto	10.080	..	·642	..	..	Dr. Fyfe.
Wigan	9,500	..	·460 to ·520	..	..	Ditto.
Ditto	11,200	..	·606	..	..	Mr. J. Hedley.
Ditto	9,500	..	·580	..	..	Liverpool Gas Co.
Ditto, Ince Hall	11,673	..	·620	1474	..	Mr. J. Leigh.
Ditto, do.	11,400	20·	·528	1411*	4·76*	Mr. Evans, Chartered Co.
Ditto	12,010	15·23	·566	1360	11·69	Dr. Fyfe.
Ditto, Balcarres's	11,500	..	..	..	..	Mr. J. Leigh.
Ditto, Blundell's	11,500	..	..	..	..	Ditto.
Ditto	9,408	..	·478	..	..	Mr. Wright.
Ditto, Hulton's	10,500	..	..	..	..	Mr. J. Leigh.
Ditto	14,453	..	·640	..	..	Mr. Clegg.
Ditto	14,267	..	·610	..	..	Ditto.
Ditto, Kay & Dewsbury's	11,300	..	..	..	..	Mr. J. Leigh.
Ditto, Rosebridge	11,125	22·63	..	1414	5·	Mr. Paterson.
Ditto, Scot Lane	11,980	22·8	..	1411	4·6	Ditto.
Worsley	11,030	19·	..	1439	7·32	Ditto.
Wyan	14,453	..	·640	..	..	Mr. Clegg.
Yorkshire	11,500	..	·451	..	..	Dr. Fyfe.
Ditto, West Iron and Coal Comp., West Ardsley, near Leeds	10,296	21·	..	1344	..	Mr. W. Hugon.
NEWCASTLE COALS.						
Benton Main	10,987	..	·400	..	..	Mr. Clegg.
Berwick and Craister's Wallsend	12,507	..	·470	..	..	Ditto.
Blenkinsopp	11,200	..	·521	..	..	Mr. J. Hedley.
Ditto	9,700	14·	·450	1389	8·2	Mr. L. Thompson.
Dean's Primrose	10,500	..	·430	1585	3·4	Ditto.
Ditto	11,120	..	·410	..	..	Mr. Clegg.
Ditto	10,500	12·	·430	..	..	Mr. Evans, Chartered Co.
Eden Main	10,400	..	·400	..	..	Mr. Clegg.
Ellison's Main	11,200	..	·416	..	..	Ditto.
English caking coal	8,000	..	·420	..	..	Dr. Fyfe.
Felling Main	11,200	..	·410	..	..	Mr. Clegg.
Garesfield	10,500	..	·398	..	..	Mr. L. Thompson.
Ditto, Bute's	..	..	..	1606	4·4	Ditto.
Ditto, Cowan's	..	..	..	1581	1·3	Ditto.
Ditto	10,500	11·5	·398	..	..	Mr. Evans, Chartered Co.
Gosforth	10,000	..	·402	1456	1·5	Mr. L. Thompson.
Ditto	10,000	12·	·402	..	..	Mr. Evans, Chartered Co.

---

* Mr. L. Thompson.

Name of Coal.	Cubic Feet of Gas Obtained per Ton.	Illumin. Power of Gas in Stand. Sperm Candles.	Specific Grav. of the Gas. Air, 1·000.	Weight of Coke in lbs. per Ton.	Ash in Coke per Cent.	Authority.
NEWCASTLE—*continued.*						
Hasting's Hartley	10,300	12·5	·421	1420	3·1	Mr. L. Thompson.
Heaton Main	10,400	..	·410	..	..	Mr. Clegg.
Hutton Seam	8,700	..	..	..	..	Hartlepool Gas Co.
Leverson	10,800	..	·425	1458	7·52	Mr. L. Thompson.
Ditto	10,800	12·5	·425	..	..	Mr. Evans, Chartered Co.
Newcastle	9,000	12·	..	..	..	Chartered Gas Co.
Ditto	11,648	..	·475	..	..	Mr. J. Hedley.
Ditto	9,450	13·5	..	..	..	Brighton Gas Co.
Ditto	9,420	13·5	..	..	..	Brighton and Hove Gas Co.
Ditto	8,500	..	·412	..	..	London, 1837.
Ditto	9,395	14·2	..	..	..	South Metropolitan Co.
Ditto	9,200	..	..	..	..	Exeter Gas Co.
Ditto	8,400	..	..	..	..	Stamford Gas Co.
New Pelton	10,500	12·	·415	1564	2·5	Mr. L. Thompson.
Peareth's Wallsend	11,147	..	·410	..	..	Mr. Clegg.
Ditto	9,700	12·	..	..	..	Cambridge Gas Co.
Pelton	11,000	14·	·430	..	..	Mr. Evans, Chartered Co.
Ditto	11,000	14·	·430	1604	1·96	Mr. L. Thompson.
Ditto	11,424	..	·437	..	..	Mr. J. Hedley.
Ditto	9,746	15·93	·555	1563	..	Dr. Fyfe.
Pelaw	11,424	..	·444	..	..	Mr. J. Hedley.
Ditto	11,000	..	·420	..	..	Mr. L. Thompson.
Ditto	11,000	12·75	·420	..	..	Mr. Evans, Chartered Co.
Pelaw Main	12,400	..	·420	1561*	3·7*	Mr. Clegg.
Ditto	8,976	14·	..	..	..	Bury St. Edmund's Gas Co.
Russell's Wallsend	12,000	..	·418	..	..	Mr. Clegg.
South Pelaw	9,000	12·5	..	..	..	Rochester Gas Co.
South Peareth	..	..	..	1617	2·5	Mr. L. Thompson.
South Tyne	..	..	..	1427	6·1	Ditto.
Urpeth	..	..	..	1597	1·89	Ditto.
Wallsend, Newcastle	12,000	..	·490	..	..	Revolving Web Retort.
Washington	10,000	14·	·430	1540	3·2	Mr. L. Thompson.
West Hartley	10,500	12·5	·420	1438	7·3	Ditto.
LANCASHIRE, DERBYSHIRE, STAFFORDSHIRE, WELSH, AND OTHER KINDS OF COAL.						
Arley	10,200	13·	·462	1540	6·	Mr. J. E. Clift.
Ditto	..	..	..	1485	4·8	Mr. L. Thompson.
Ditto	11,200	13·8	·406	1460	..	Ditto.
Ashton-under-Lyme coal slack	9,000	10·	..	..	..	Stafford Gas Co.
Bickerstaff, Liverpool	11,424	..	·475	..	..	Mr. J. Hedley.
Bilston	7,100	9·5	..	..	..	Bilston Gas Co.
Brancepeth	8,500	13·	..	..	..	Harrogate Gas Co.
Brymbo, 2-yard coal	8,800	..	·463	..	..	Mr. Wright.
Ditto, main	10,500	15·	·540	..	..	Mr. L. Thompson.
Cheshire	..	..	..	1534	7·3	Ditto.
Cumberland, No. 1	..	..	..	1669	2·8	Ditto.
Ditto, No. 2	..	..	..	1667	1·9	Ditto.
Ditto, No. 3	..	..	..	1548	5·8	Ditto.
Derbyshire	8.000	13·	..	..	..	Leamington Gas Co.
Ditto	8,500	13·	..	..	..	Leicester Gas Co.

---

* Mr. L. Thompson.

Name of Coal.	Cubic Feet of Gas Obtained per Ton.	Illumin. Power of Gas in Stand. Sperm Candles.	Specific Grav. of the Gas. Air, 1·000.	Weight of Coke in lbs. per Ton.	Ash in Coke per Cent.	Authority.
Various Coals—*con.*						
Derbyshire	8,500	15·	..	..	..	Oxford Gas Co.
Ditto, Staveley. . . .	..	..	..	1324	4·57	Mr. L. Thompson.
Ditto, deep main . . .	9,400	..	·424	..	..	Mr. Wright.
Ditto, soft coal	7,500	..	·528	..	..	Leicester Gas Co.
Ditto, do.	7,000	..	·448	..	..	Derby Gas Co.
Ditto, do.	7,000	..	·424	..	..	Nottingham Gas Co.
Durham Fields, best seam.	8 600	12·	..	..	..	Sunderland Gas Co.
Forest of Dean, 1st variety	10,133	..	·350	..	..	Mr. Clegg.
Ditto, 2nd do.	10,133	..	·360	..	..	Ditto.
Ditto	9,000	8 to 9	..	..	..	Gloucester Gas Co.
France, Denain (Valen.) .	..	..	.	1570	8·57	Mr. L. Thompson.
Gloucestrs.,Coal-Pit Heath	..	..	..	1566	8·3	Ditto.
Ditto, Whitecroft, near Lydney	..	..	..	1472	16·8	Ditto.
Leeds coal	6,500	..	·530	..	..	Leeds Gas Co.
Llanelly, Wales	5 000 to 8,000	..	..	..	..	Llanelly Gas Co.
Lump coal, Westbromwich	6,500	..	·453	..	..	Birmingham Gas Co.
Ditto, do.	6,500	..	·455	..	..	Birm. and Stafford. Gas Co.
Macclesfield	6,720					
Mynydd Bach-y-Glo Colliery coal	7,000	9·	..	..	..	Swansea Gas Co.
Neath, South Wales . . .	11,200	..	·468	..	..	Mr. J. Hedley.
Ormskirk or Wigan slack .	8,200	..	·462	..	..	Liverpool Old Gas Co.
Park Gate coal	7,500	11·	..	..	..	Rotherham Gas Co.
Powell coal, 2 cwt. charges every 5 hours . . .	10,165	..	·459	..	..	Mr. Wright.
Powell coal, 1½ cwt. charges every 5 hours . . .	8,250	..	·470	..	..	Ditto.
Silkstone.	8,600	13·3	..	..	..	Great Grimsby Gas Co.
Somersetshire coal . . .	8,000	..	..	..	..	Wells Gas Co.
Ditto, Heathern . . .	..	..	..	1279	·80	Mr. L. Thompson.
Ditto, Silverdale, 10 feet.	..	..	..	1478	2·92	Ditto.
Ditto	7,730	11 to 12	..	..	..	Bath Gas Co.
Ditto, Apedale	..	..	..	1378	3·1	Mr. L. Thompson.
Ditto, Woodshuts, Banbury, 7 feet	..	..	..	1340	2·03	Ditto.
South Yorkshire coal, best.	9.000	14·	..	..	..	Sheffield Gas Co.
South Staffordsh., 1st var.	10,933	..	·398	..	..	Mr. Clegg.
Ditto, 2nd do.	10,667	..	·395	..	..	Ditto.
Ditto, 3rd do.	10.667	..	390	..	..	Ditto.
Ditto, 4th do.	9.600	..	·320	..	..	Ditto.
St. Helen's	..	..	..	1407	1·91	Mr. L. Thompson.
Stockport	7,800	..	·539	..	..	Stockport Gas Co.
Welsh coal, 1st variety. .	10 000	..	·385	..	..	Mr. Clegg.
Ditto, 2nd do. . .	10,133	..	380	..	..	Ditto.
Wigan and St. Helen's caking coal	9,168	16·25	..	..	..	Mr. Paterson.
Wales (North), Ruabon top yard seam . . .	..	..	..	1400	4·	Mr. L. Thompson.
Ditto, main coal . . .	..	..	..	1310	1·7	Ditto.
Ditto, yard seam . . .	..	..	..	1478	2·1	Ditto.
Ditto, Nant seam . . .	..	..	..	1391	2·2	Ditto.
Wales (South), Rhonda. .	..	..	..	1729	3 5	Ditto.
Ditto, low main . . .	..	..	..	1723	2 7	Ditto.
Ditto, Neath.	11,200	..	·468	..	..	Mr. J. Hedley.

Name of Coal.	Cubic Feet of Gas Obtained per Ton.	Illumin. Power of Gas in Stand. Sperm Candles.	Specific Grav. of the Gas. Air, 1·000.	Weight of Coke in lbs. per Ton.	Ash in Coke per Cent.	Authority.
VARIOUS COALS—*con.*						
Yorkshire, Elsecar Low Pit	...	..	..	1411	1·74	Mr. L. Thompson.
Do., Grigleston Cliff, soft.	..	..	..	1443	2·48	Ditto.
Ditto, Mortomly . . .	..	..	..	1411	2·	Ditto.
Ditto, Silkstone. . . .	8,600	13·3	..	..	..	Great Grimsby Gas Co.
Ditto ditto, No 1 .	..	..	..	1476	4·2	Mr. L. Thompson.
Ditto ditto, No. 2 .	..	..	..	1389	4·1	Ditto.
Ditto ditto, No. 3 .	..	..	..	1452	4·0	Ditto.
Soap House Pit	..	..	..	1456	1·2	Ditto.
Woodthorp	..	..	..	1499	16·6	Ditto.
Best South Yorkshire . .	9,000	14·	..	..	..	Sheffield Gas Co.
MIXTURES OF CANNEL AND COAL.						
Proportions specified.						
Boghead cannel $\frac{1}{8}$th, Arley Mine coal $\frac{7}{8}$ths . . .	10,400	16·5	..	..	..	Blackburn Gas Co.
Boghead cannel 5 per cent, Newcastle coal 95 p. c.	10,000	14·	..	..	..	Devonport Gas Co.
Boghead cannel $\frac{1}{4}$th, Pelton coal $\frac{3}{4}$ths	12,800	..	..	..	..	Mr. T. G. Barlow.
Boghead cannel $\frac{1}{10}$th, Lochgelly cannel $\frac{9}{10}$ths . .	9,055	24·93	..	..	..	Ditto.
Drighlington cannel $\frac{1}{4}$th, Halifax soft bed cl. $\frac{3}{4}$ths	9,000	18·9	..	..	..	Shipley Gas Co.
Ince Hall cannel 68 p. ct., Arley coal slack 32 p. c.	10,206	19·01	·527	1396	6·4	Rossendale Union Gas Co.
Lesmahago cannel 6 per ct., Cumber. coal 94 p. ct.	7,000	15·	..	..	..	Carlisle Gas Co.
Wigan Coal and Iron Co.'s cannel 72 p. ct., Arley coal slack 28 per cent.	9,967	19·65	·530	1462	5·2	Rossendale Union Gas Co.
Wigan cannel $\frac{2}{3}$rds, coal $\frac{1}{3}$rd	9,600	17·	..	..	..	Heywood Gas Co.
Cannel and Newcastle coal, 1 to 5	9,000	14·	..	..	..	Alliance Gas Co., Dublin.
Half cannel coal, $\frac{1}{2}$ blk. bed	9,000	16·	..	..	..	Pudsey Gas Co.
Half cannel, $\frac{1}{2}$ coal . . .	9,450	13·5	..	..	..	St. Helen's Gas Co.
Proportions not specified.						
Wigan cannel and other cls.	10,091	21·	..	..	..	Birkenhead Gas Co.
Cannel and bett or bed cls.	9,250	18·	..	..	.	Bradford Gas Co.
Cannel and best coal . .	9,500	12·5	..	..	..	Glossop Gas Co.
Ramsey's cannel with Newcastle caking coals. .	9,500 to 10,000	12·	..	..	..	Hastings Gas Co.
Cannel and best house coal.	9,000	12 to 14	..	..	..	Holmfirth Gas Co.
Cannel and coal	9,000	18·	..	..	..	Leeds Gas Co.
Cannel and Newcastle coal.	9,300	12·5	..	..	..	Phœnix Gas Co.
Ditto ditto . . .	9,400	12·	..	..	..	Plym. and Stone. Gas Co.
Ditto ditto . . .	8,000 to 9,000	12	..	..	..	Portsea Island Gas Co.
Cannel and coal	9,000	14·	..	..	..	Runcorn Gas Co.
Ditto ditto	7,500	..	..	..	..	Shrewsbury Gas Co.
West Riding cannel and common coal. . . .	8 000	10 to 14	..	..	..	Scarborough Gas Co.
Cannel and coal	9,500	10·	..	..	..	Cardiff Gas Company.

Name of Coal.	Cubic Feet of Gas Obtained per Ton.	Illumin. Power of Gas in Stand. Sperm Candles.	Specific Grav. of the Gas. Air, 1·000.	Weight of Coke in lbs. per Ton.	Ash in Coke per Cent.	Authority.
MIXTURES OF CANNEL AND COAL—*con.*						
Oldham, Watergate, and Wigan cannel . . .	9,500	..	·534	..	..	Manchester Gas Co.
Cannel and common coal .	8,000	..	·466	..	..	Sheffield Gas Co.
MIXTURES OF DIFFERENT COALS.						
Coal-Pit Heath, Forest of Dean, and South Wales	7,000	13·	..	..	..	Bristol Gas Co.
Derbyshire and Staffordshire coal	8,500	10 to 12	..	..	..	Warwick Gas Co.
Ditto ditto . . .	9,000	9 to 10	..	..	..	Worcester Gas Co.
Derbyshire, Nottinghamsh. and Yorksh. best coal.	7,800 to 8,200	12 to 15	..	..	..	Nottingham Gas Co.
Derbyshire and Forest of Dean coal	9,000	10·	..	..	..	Cheltenham Gas Co.
Low Moor mixed with two kinds of slack . . .	8,000	..	·420	..	..	Bradford Gas Co.
New Pelton and other Newcastle coals	8,500	13·	..	..	..	Kingston-upon-Thames Gas Co.
Newport (Monmouthshire) and Somersetsh. coals.	Newport 8,000 Somers. 5,500	9·	..	..	..	Weston-super-Mare Gas Co.
Ravensworth Pelaw and Newcastle coals. . .	9,000	13·	..	..	..	Beccles Gas Co.
Silkstone and Renshw. coal.	7,500	11·5	..	..	..	Lincoln Gas Co.
S. Wales and Bristol coal .	7,500	..	..	..	..	Bridgewater Gas Co.
Stafford. and Derby. coal .	8,800	12·5	..	..	..	Birmingham Gas Co.
MIXTURES OF COAL AND OTHER SUBSTANCES.						
Llantwit small coal, with 5 per cent. of Broxbourne shale oil. . .	9,750	21·5	..	..	..	Mr. T. G. Barlow.
Newcastle coal 80 per cent., Trinidad bitumen 20 per cent.	10,600	17·6	..	..	..	Dr. Letheby and Mr. Keates.
Newcastle coal 90 per cent., Trinidad bitumen, 10 per cent.	10,200	15·6	..	..	..	Dr. Letheby and Mr. Keates.
New Brunswick Albertite.	9,166 to 10,200	28·66 to 35·42	..	..	..	Mr. Evans.

CANNEL AND COAL NUTS AND SLACK

Are only suitable for making gas where high heats are kept up. They cannot be used to advantage in Iron Retorts. When the heat is not high they cake together in a mass, and at the end of the charge are drawn from the retort in a comparatively unspent condition.

PRODUCTION PER TON OF COAL IN SUMMER AND WINTER.

The average production of gas per ton of coal and cannel is always less (apparently) in Summer than in Winter. The reason of this is that the heats cannot be kept up so well in Summer because of the cold ovens on every side; but more especially because the temperature of the gas, when passing the Station-meter, is necessarily lower when the production is small. The same length of pipe, both condensing and otherwise, has to be traversed, and the condensing surface being proportionately greater as the quantity of gas produced diminishes, the bulk or volume of gas is reduced, and the production per ton apparently lessened.

TABLE,

By Miller, exhibiting the amount and specific gravity of the gas obtained from two bushels of coal during each of five hours heating in an ordinary retort; showing the importance of restricting the time during which the coal is subjected to the action of heat in the manufacture of gas. The rich hydrocarbons diminished, and carbonic oxide and hydrogen increased in quantity as the experiment progressed.

	Cubic Feet.	Specific Gravity.
In the first hour	345	·677
In the second hour	203	·419
In the third hour	118	·400
In the fourth hour	54	·322
In the fifth hour	20	—

With cannel the carbonization takes place in considerably less time than coal.

WIGAN CANNEL AND COAL.

Wigan coal and cannel produce on an average per ton:—

	Cannel.	Coal.
Gas	10,900 cubic feet	9980 cubic feet.
Illuminating power	21·25 sperm candles	11·4 sperm candles.
Coke	1436 lbs.	1517 lbs.
Tar	17 gallons	11 gallons.
Ammoniacal water	18 gallons	20 gallons.

Coke, when slaked with water, weighs from 20 to 25 per cent. more than when unslaked.

A ton of coke is about a chaldron and a half.

A chaldron of coke varies in weight from 12½ to 15 cwt.

The effect of a too low heat in the retorts is to diminish the gaseous products, the chief result of the distillation being the production of tar.

TO FIND THE VALUE OF GAS AND COAL.

To Find the Value of Gas in Grains of Sperm per Cubic Foot, from the given Illuminating Power.

Rule.—Multiply 120 (the grains allowed per hour for the consumption of the standard sperm candle) by the illuminating power, and divide by 5 (consumption of gas in cubic feet per hour by the standard burner). The answer will be the value of the gas in grains of sperm per cubic foot.

Example.—What is the value of gas in grains of sperm per cubic foot, the illuminating power of which is 19·46 candles?

$$\frac{19{\cdot}46 \times 120}{5} = 467 \text{ grains of sperm.—}\textit{Answer.}$$

To Find the Illuminating Power of Gas in Standard Sperm Candles, from the given Value of Gas in Grains of Sperm per Cubic Foot.

Rule.—Multiply the number of grains of sperm per cubic foot by 5 (the consumption of gas in cubic feet per hour by the standard burner), and divide by 120 (the grains allowed per hour for the consumption of the standard sperm candle). The answer will be the illuminating power.

Example.—What is the illuminating power of gas in standard sperm candles of 120 grains, the value of which is 378 grains of sperm per cubic foot?

$$\frac{378 \times 5}{120} = 15{\cdot}75, \text{ the illuminating power in standard sperm candles.}$$

To Find the Value of any Coal per Ton in Pounds of Sperm, the Yield of Gas and Illuminating Power being known.

Rule.—Multiply the cubic feet produced per ton by the value of the gas in grains of sperm per cubic foot (ascertained by the previous rule), and divide by 7000 (the number of grains in 1 lb. avoirdupois). The answer will be the value of the coal in lbs. of sperm per ton.

Example.—What is the value of a certain coal in lbs. of sperm per ton, whose yield of gas is 10,540 cubic feet, and illuminating power 19·63 standard sperm candles?

$$\frac{19{\cdot}63 \times 120}{5} = 471, \text{ value of the gas in grains of sperm per cubic foot;}$$

then

$$\frac{10{,}540 \times 471}{7000} = 709{\cdot}19 \text{ lbs. of sperm per ton, value.}$$

To Find the Weight of any Quantity of Gas in Pounds, the Specific Gravity being known.

Rule.—Multiply the quantity in feet by the specific gravity, and the product by ·0766, and the answer will be the weight of gas in lbs.

Example.—What is the weight of 9400 cubic feet of gas, its specific gravity being ·424?

$$9400 \times {\cdot}424 \times {\cdot}0766 = 305{\cdot}29 \text{ lbs. of gas.}$$

For roughly Estimating the Amount of Coal or Cannel required to Produce a Given Quantity of Gas.

Rule.—Strike off the last four figures from the quantity of gas produced, and the figures remaining will represent the coal and cannel in tons.

Thus: 20|0,000 cubic feet = 20 tons.

This will be evident when it is remembered that a ton of coal or cannel (Wigan) produces about 10,000 cubic feet of gas. If the production rise to 11,000, or fall to 9000 per ton, one-tenth must be deducted or added as the case may be.

SPECIFIC GRAVITY OF COAL GAS.

If coal gas contains no carbonic acid, specific gravity is a proper test of quality; the heavier it is the greater will be its illuminating power.

Mr. Wright's method of ascertaining the specific gravity of gas has the merit of removing difficulties which hindered the attainment of a correct result. Instead of a flask, which is objectionable on account of its weight, he uses a light balloon capable of containing 1000 cubic inches.

His directions for performing the experiment, and table for correcting the temperature and barometric pressure of the gas according to the usual standard (60° Fahr., and 30 inches barometric pressure), are as follows :—

Expel the air from the balloon by folding in the form in which it is first received, ascertain the weight of the balloon and car, fill the balloon with gas, insert the stopper, and put as many grains* in the car as will balance it in the air; add the number of grains which it carries to the weight of the balloon, and deduct the amount from the tabular number corresponding to the degree of temperature indicated by the thermometer and the pressure indicated by the barometer; divide the result by the tabular number due to the temperature and pressure of the gas (to ascertain which, allow the gas to blow upon the bulb of the thermometer until the mercury is stationary), and the three first figures are the specific gravity.

EXAMPLE I.

Temperature of the air	70°	Tabular number 932.
Barometer	28·5 in.	
Temperature of gas	56°	Tabular number 958.
Barometer always the same as air .	28·5 in.	

Weight of balloon and grains in car, 560.

932 Tabular number for the air.
560 Weight of balloon, &c.

Tabular number for the gas, 958) 3720 (388 specific gravity.
2874

8460
7664

7960
7664

296

EXAMPLE II.

Temperature of the air	40°	Tabular number 1058.
Barometer	30·5 in.	
Temperature of gas	62°	Tabular number 1013.
Barometer always the same as air .	30·5 in.	

Weight of balloon and grains in car, 560.

1058 Tabular number for the air.
560 Weight of balloon, &c.

Tabular number for the gas, 1013) 4980 (491 specific gravity.
4052

9280
9117

1630
1013

617

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* The weights used are not troy grains, 100 of them being equal to 31· troy grains; they are each equal to a cubic inch of air, when the barometer is at 30 inches, and the thermometer at 60°.

SPECIFIC GRAVITY TABLE,

For Corrections of Temperature and Barometric Pressure of Gas.

BAR.	THER. 32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	52°	54°	56°	58°	60°
28·0	988	984	980	976	971	968	964	960	956	952	948	944	941	937	933
28·1	991	987	983	979	975	971	967	963	959	955	952	948	944	940	937
28·2	995	991	987	983	979	975	971	967	963	959	955	951	947	944	940
28·3	998	994	990	986	982	978	974	970	966	962	958	955	951	947	943
28·4	1002	998	993	990	985	981	977	973	970	966	962	958	954	950	947
28·5	1005	1001	997	993	989	985	981	977	973	969	965	961	958	954	950
28·6	1009	1005	1000	996	992	988	984	980	976	972	969	965	961	957	953
28·7	1012	1008	1004	1000	996	992	988	984	980	976	972	968	964	960	957
28·8	1016	1012	1008	1003	999	995	991	987	983	979	975	971	968	964	960
28·9	1020	1015	1011	1007	1003	999	995	991	987	983	979	975	971	967	963
29·0	1023	1019	1015	1010	1006	1002	998	994	990	986	982	978	974	970	967
29·1	1027	1022	1018	1014	1010	1006	1002	998	993	989	985	982	978	974	970
29·2	1030	1026	1022	1017	1013	1009	1005	1001	997	993	989	985	981	977	973
29·3	1034	1029	1025	1021	1017	1012	1008	1004	1000	996	992	988	984	981	977
29·4	1037	1033	1029	1024	1020	1016	1012	1008	1004	1000	996	992	988	984	980

BAR.	THER. 62°	64°	66°	68°	70°	72°	74°	76°	78°	80°	82°	84°	86°	88°	90°
28·0	930	926	922	919	915	912	908	905	901	898	895	891	888	885	881
28·1	933	929	926	922	919	915	912	908	905	901	898	894	891	888	884
28·2	936	933	929	925	922	918	915	911	908	904	901	898	894	891	888
28·3	940	936	932	929	925	922	918	914	911	908	904	901	897	894	891
28·4	943	939	936	932	928	925	921	918	914	911	907	904	900	897	894
28·5	946	943	939	935	932	928	925	921	917	914	910	907	904	900	897
28·6	650	946	942	939	935	931	928	924	921	917	914	910	907	903	900
28·7	953	949	945	942	938	935	931	927	924	920	917	913	910	907	903
28·8	956	952	949	945	941	938	934	931	927	924	920	917	913	910	906
28·9	960	956	952	948	944	941	937	934	930	927	923	920	916	913	910
29·0	963	959	955	952	948	944	941	937	934	930	926	923	919	916	913
29·1	966	962	959	955	951	948	944	940	937	933	930	926	923	919	916
29·2	969	966	962	958	954	951	947	944	940	936	933	929	926	922	919
29·3	973	969	965	961	957	954	950	947	943	940	936	933	929	926	922
29·4	976	972	969	965	961	957	954	950	946	943	939	936	932	929	925

BAR	THER. 32°	34°	36°	38°	40°	42°	44°	46°	48°	50°	52°	54°	56°	58°	60°
29·5	1041	1036	1032	1028	1024	1019	1015	1011	1007	1003	999	995	991	987	983
29·6	1044	1040	1036	1031	1027	1023	1019	1015	1010	1006	1002	998	994	991	987
29·7	1048	1043	1039	1035	1031	1026	1022	1018	1014	1010	1006	1002	998	994	990
29·8	1051	1047	1043	1038	1034	1030	1026	1022	1017	1013	1009	1005	1001	997	993
29·9	1055	1050	1046	1042	1038	1033	1029	1025	1021	1017	1013	1009	1005	1001	997
30·0	1058	1054	1050	1045	1041	1037	1033	1028	1024	1020	1016	1012	1008	1004	1000
30·1	1062	1057	1053	1049	1044	1040	1036	1032	1028	1023	1019	1015	1011	1007	1003
30·2	1065	1061	1057	1052	1048	1044	1039	1035	1031	1027	1023	1019	1015	1011	1007
30·3	1069	1064	1060	1056	1051	1047	1043	1039	1034	1030	1026	1022	1018	1014	1010
30·4	1072	1068	1064	1059	1055	1051	1046	1042	1038	1034	1029	1025	1021	1017	1013
30·5	1076	1071	1067	1063	1058	1054	1050	1045	1041	1037	1033	1029	1025	1021	1017
30·6	1079	1075	1071	1066	1062	1057	1053	1049	1045	1040	1036	1032	1028	1024	1020
30·7	1083	1079	1074	1070	1065	1061	1057	1052	1048	1044	1040	1036	1031	1027	1023
30·8	1087	1082	1078	1073	1069	1064	1060	1056	1051	1047	1043	1039	1035	1031	1027
30·9	1090	1086	1081	1077	1072	1068	1063	1059	1055	1051	1046	1043	1038	1034	1030
31·0	1094	1089	1085	1080	1076	1071	1067	1063	1058	1054	1050	1046	1042	1037	1033

BAR.	THER 62°	64°	66°	68°	70°	72°	74°	76°	78°	80°	82°	84°	86°	88°	90°
29·5	979	976	972	968	964	961	957	953	950	946	942	939	935	932	928
29·6	983	979	975	971	968	964	960	957	953	949	946	942	939	935	932
29·7	986	982	978	975	971	967	963	960	956	952	949	945	942	938	935
29·8	989	986	982	978	974	970	967	963	959	956	952	948	945	941	938
29·9	993	989	985	981	978	974	970	966	963	959	955	952	948	944	941
30·0	996	992	988	984	981	977	973	969	966	962	958	955	951	948	944
30·1	999	995	992	988	984	980	976	973	969	965	962	958	954	951	947
30·2	1003	999	995	991	987	983	980	976	972	969	965	961	958	954	950
30·3	1006	1002	998	994	990	987	983	979	975	972	968	964	961	957	954
30·4	1009	1005	1002	998	994	990	986	982	979	975	971	968	964	960	957
30·5	1013	1009	1005	1001	997	993	989	986	982	978	974	971	967	963	960
30·6	1016	1012	1008	1004	1000	996	993	989	985	981	978	974	970	967	963
30·7	1019	1015	1011	1007	1004	1000	996	992	988	985	981	977	973	970	966
30·8	1023	1019	1015	1011	1007	1003	999	995	991	988	984	980	977	973	970
30·9	1026	1022	1018	1014	1010	1006	1002	998	995	991	987	984	980	976	973
31·0	1029	1025	1021	1017	1013	1009	1006	1002	998	994	990	987	983	979	976

The weight of any quantity of air may be known by multiplying the quantity in feet by the tabular number corresponding to the temperature and barometric pressure at the time, and by the decimals ·07529 or ·0753. Strike off the proper decimals, the answer will be the weight in pounds avoirdupois.

TABLE

Comparing the Specific Gravity of Gas (Air being 1·000) with the Illuminating Power in Standard Sperm Candles.

No. of Candles.		Specific Gravity.	No. of Candles.		Specific Gravity.
10	equal to about	·380	24	equal to about	·565
11	,,	·392	25	,,	·585
12	,,	·405	26	,,	·605
13	,,	·416	27	,,	·625
14	,,	·430	28	,,	·645
15	,,	·443	29	,,	·662
16	,,	·455	30	,,	·678
17	,,	·468	31	,,	·694
18	,,	·482	32	,,	·708
19	,,	·495	33	,,	·722
20	,,	·508	34	,,	·738
21	,,	·522	35	,,	·755
22	,,	·537	36	,,	·775
23	,,	·550	37	,,	·790

ANALYSES OF COALS.*

By Mr. L. Thompson.

CANNEL COALS.

Name and General Character of Cannel.	Volatile Matter.	Coke.	Ash in Coke.	Nature of Ash.	Sulphur in		
					Coal.	Coke.	Volatile Matter.
Arniston—Resembling lignite, and containing crystals of carbonate of lime, with impressions of leaves and deposits of iron pyrites. Compact. Principal fracture, slaty; cross fracture, irregular. Streak, dull brownish black. Thrown on the fire, it decrepitates, but does not fly. Colour of ash, a dirty grey; with nitrate of cobalt, greenish black. Specific gravity of coal, 1·1967.	45·5	54·5	4·18 or 7·66 per cent.	Silicate of lime, alumina, and oxide of iron.	1·70	·95	·75
Boghead—Brown, compact, and massive, containing a few impressions of sigillaria. Principal fracture, slaty, conchoidal; cross fracture, irregular. Streak, yellow. Thrown on the fire, decrepitates slightly, does not fuse, but splits. Colour of ash, white; with nitrate of cobalt, blue. Specific gravity, 1·221.	68·4	31·6	22·8 or 70·25 per cent.	Silicate of alumina.	·53	·08	·45
Capeldrae—Massive, dull black, impressions of sigillaria, with deposits of carbonate of lime and pyrites. Principal fracture, conchoidal and slaty; cross fracture, distinctly conchoidal. Streak, yellowish brown. Thrown on the fire, decrepitates, splits, and flies, but does not fuse. Ash, white; with nitrate of cobalt, blue. Specific gravity, 1·2275.	54·5	45·5	10·5 or 23·07 per cent.	Silicate of alumina.	·65	·20	·45

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* From the *Journal of Gas Lighting*, Vol. II., pp. 203, 223, 243, 262.

Name and General Character of Cannel.	Volatile Matter.	Coke.	Ash in Coke.	Nature of Ash.	Sulphur in		
					Coal.	Coke.	Volatile Matter.
Kirkness—Massive and foliated, free from foreign matters. Dull brown. Principal fracture, slaty; cross fracture, conchoidal. Streak, brown. Scarcely decrepitates on the fire. Colour of ash, whitish grey; with nitrate of cobalt, dull dark blue. Specific gravity, 1·2080.	60·	40·	13·5 or 33·7 per cent.	Silicate of alumina, lime, and oxide of iron.	1·40	·58	·82
Knightswood—Compact, dull black, massive, with deposits of carbonate of lime and iron pyrites. Principal fracture, slaty, conchoidal; cross fracture, conchoidal. Streak, shining black. Thrown on the fire, decrepitates and flies, but does not fuse. Colour of ash, pale umber; with nitrate of cobalt, dull black.	48·5	51·5	2·4 or 4·66 per cent.	Oxide of iron and silicate of lime, with alumina.	1·10	·61	·49
Lesmahago—Massive, dull black. Principal fracture, slaty, conchoidal; cross fracture, conchoidal and angular. Streak, black and somewhat shining. Thrown on the fire, decrepitates slightly, does not split or fuse. Colour of ash, white; with nitrate of cobalt, dirty blue. Specific gravity, 1·2220.	49·6	50·4	9·1 or 18·05 per cent.	Silicate of alumina and oxide of iron.	2·23	1·14	1·09
Lochgelly—Colour, dull black and slaty. Fracture, inclining to slaty; cross fracture, irregular conchoidal. Streak, shining black. On the fire, decrepitates and flies. Ash, white; with nitrate of cobalt, blue. Specific gravity, 1·320.	33·5	66·5	13·1 or 29·7 per cent.	Silicate of alumina.	·75	·25	·50
Old Wemyss—Compact, dull brownish black; free from foreign matters. Principal fracture, slaty; cross fracture, angular, inclining to conchoidal. Streak, dull brownish black. Thrown on the fire, decrepitates and splits, but does not fly. Colour of ash, dull white; with nitrate of cobalt, olive green. Specific gravity, 1·3256.	52·5	47·5	15·1 or 31·78 per cent.	Oxide of iron and silicate of alumina.	1·30	·60	·70
Wigan—Compact, black and shining. Principal fracture, conchoidal; cross fracture, conchoidal and cubical. Streak, shining black and waxy. Thrown on the fire, decrepitates, flies, and slightly fuses. Colour of ash, yellowish brown, inclining to red; with nitrate of cobalt, olive black. Sp. gr., 1·271.	37·	63·	3· or 4·76 per cent.	Oxide of iron and silicate of alumina.	1·25	·60	·65

Name and General Character of Cannel.	Volatile Matter.	Coke.	Ash in Coke.	Nature of Ash.	Sulphur in		
					Coal.	Coke.	Volatile Matter.
Ramsay's Newcastle—Compact and massive, slightly tinged with oxide of iron. Black and shining. Principal fracture, highly conchoidal and resinoid; cross fracture, conchoidal and cubical. Thrown on the fire, decrepitates and flies to pieces, inclined to fuse. Colour of ash, reddish brown; with nitrate of cobalt, dull black. Specific gravity, 1·290.	36·8	63·2	6·6 or 10·44 per cent.	Oxide of iron and silicate of lime, with alumina.	1·75	·94	·81
Band of Cannel in *Leverson's Wallsend Coal.*—This is a dull black band, which runs through the mass of the coal. Fracture, slaty, conchoidal; cross fracture, cubical and conchoidal. Streak, black and shining. On the fire, splits, but does not fly or fuse. Ash, dull white, with shade of pink; with nitrate of cobalt, dull black. Specific gravity, 1·320.	30·8	69·2	9·35 or 13·67 per cent.	Oxide of iron and silicate of lime, with alumina.	1·00	·50	·50
Band of Cannel in *Pelton Main Coal.*—Colour, dull black, with a shade of brown. Structure, compact and uniform. Fracture, conchoidal and slaty; cross fracture, irregular, conchoidal, with deposits of iron pyrites. Streak, black and shining. On the fire, splits, but does not fly; agglutinates and intumesces slightly. Ash, dirty white, with shade of pink; by nitrate of cobalt, black. Specific gravity, 1·320.	31·5	68·5	9·4 or 13·7 per cent.	Oxide of iron and silicate of lime, with alumina.	·95	·49	·46
Band of Cannel in *Washington Coal.*—This resembles the Pelton and Leverson's bands. Colour, dull brownish black. Fracture, irregular, conchoidal; cross fracture, cubical and conchoidal. Streak, shining black. On the fire, splits and fuses slightly. Ash, dirty white, with shade of pink. Specific gravity, 1·326.	27·4	72·6	9·37 or 12·9 per cent.		1·10	·56	·54
Staffordshire—Compact and uniform. Fracture, in all directions conchoidal, with deposits of carbonate of lime. Streak, shining black. On the fire, decrepitates and flies, but does not fuse. Ash, dirty white. Specific gravity, 1·220.	50·	50·	2·9 or 5·8 per cent.		1·30	·52	·78

Name and General Character of Coal.	Volatile Matter.	Coke.	Ash in Coke.	SULPHUR IN		
				Coal.	Coke.	Volatile Matter.
NEW BRUNSWICK—Jet black, and pitchy looking. Fracture, highly conchoidal and resinoid in all directions. Streak, dull and pitchy. On the fire, cracks and splits, then fuses and boils up with strong intumescence. Largely soluble in naphtha, oil of turpentine, and bisulphuret of carbon. Specific gravity, 1·098. The coke is light and friable, like that from pitch.	66·8	33·7	·6 or 1·78 per cent.	·07	None.	·07
BITUMINOUS COALS.						
CHESHIRE: *Harecastle.*—Structure, laminated, with numerous black bands. Principal fracture, slaty, inclining to angular; cross fracture, cubical, with deposits of carbonate of lime and iron pyrites. Streak, dull black. On the fire, agglutinates a little. Ash, dirty red. Specific gravity, 1·230.	31·5	68·5	5· or 7·3 per cent.	2·10	1·10	1·00
CUMBERLAND, *No.* 1.—Dull black, and coarse grained. Fracture, rough and hackley, inclining to cubical; cross fracture, slaty and angular. Streak, dull black. On the fire, agglutinates and swells a little. Ash, dirty white. Specific gravity, 1·294.	25·5	74·5	2·1 or 2·8 per cent.	1·30	·70	·60
Cumberland, No. 2.—Coal black, with dull laminæ. Fracture, irregular, inclining to cubical; cross fracture, rough and angular, with charcoal deposits. Streak, black. On the fire, swells and fuses slightly. Ash, grey. Specific gravity, 1·275.	25·6	74·4	1·4 or 1·9 per cent.	1·10	·60	·50
Cumberland, No. 3.—Coal black, and coarse grained, semi-crystalline. Fracture, hackley and angular, with layers of charcoal; cross fracture, irregular and angular. Streak, brownish black. On the fire, swells and agglutinates. Ash, yellow white. Specific gravity, 1·290.	30·9	69·1	4· or 5·8 per cent.	1·70	·80	·90
DERBYSHIRE: *Staveley.*—Colour, jet black. Structure, splintry and prismatic. Fracture, slaty and columnar; cross fracture, irregular and cubical, with deposits of carbonate of lime and iron pyrites. Contains several black bands with charcoal. Streak, black. On the fire, crackles and splits; fuses slightly. Ash, dirty pale red. Specific gravity, 1·275.	40·9	59·1	2·7 or 4·57 per cent.	1·20	·80	·40
GLOUCESTERSHIRE: *Coal-Pit Heath.*—Colour, coal black. Structure, granular and crystalline. Fracture, coarse grained and irregular in all directions, with numerous layers of charcoal and iron pyrites, and traces of carbonate of lime. On the fire, swells and fuses slightly. Ash, brick red. Specific gravity, 1·370.	30·1	69·9	5·8 or 8·3 per cent.	4·10	2·20	1·90

Name and General Character of Coal.	Volatile Matter.	Coke.	Ash in Coke.	Sulphur in Coal.	Sulphur in Coke.	Sulphur in Volatile Matter.
GLOUCESTERSHIRE: *Whitecroft, near Lydney.*—Coarse grained and fibrous. Principal fracture, hackley and slaty, with deposits of charcoal; cross fracture, uneven, inclining to rhomboidal, with deposits of carbonate of lime and iron pyrites. Streak, dull black. On the fire, fuses slightly. Ash, deep red. Specific gravity, 1·401.	34·3	65·7	11·1 or 16·8 per cent.	3·10	1·90	1·20
LANCASHIRE: *Arley.*—Colour, coal black, with shining layers. Structure, massive. Fracture, inclining to slaty, with charcoal deposits; cross fracture, cubical, with traces of carbonate of lime. On the fire, splits slightly, and intumesces. Ash, dull fawn colour. Specific gravity, 1·270.	33·7	66·3	3·6 or 4·8 per cent.	1·20	·60	·60
St. Helen's.—Coal black and laminated. Principal fracture, slaty; cross fracture, cubical, with numerous deposits of charcoal in the principal fracture, and carbonate of lime in the cross fracture. Streak, dull black. On the fire, swells and agglutinates. Ash, fawn colour. Specific gravity, 1·285.	37·2	62·8	1·2 or 1·91 per cent.	1·10	·54	·56
NORTHUMBERLAND AND DURHAM: *Blenkinsopp.*—Coal black; laminated. Fracture, coarse and granular; cross fracture, splintry, inclining to cubical. Streak, dull black. On the fire, fuses slightly and intumesces. Ash, grey. Specific gravity, 1·298.	38·	62·	5·1 or 8·2 per cent.	1·60	·80	·80
Dean's Primrose.—Colour, brownish black, with shining layers. Fracture, in all directions, cubical and somewhat irregular, with occasional deposits of iron pyrites. On the fire, splits, and crackles slightly, swells, and intumesces. Ash, brick red. Specific gravity, 1·261.	29·25	70·75	2·4 or 3·4 per cent.	1·40	·71	·69
Garesfield (Butes').—Coal black and rather friable, with thin bands of dark laminæ throughout. Fracture, uneven and cubical; cross fracture, angular and hackley, containing traces of charcoal. Streak, dull black. On the fire, swells and fuses together. Ash, light red. Specific gravity, 1·290.	28·3	71·7	3·2 or 4·4 per cent.	·90	·40	·50
Garesfield (Cowan's).—Coal black and shining, with thin dark laminæ. Fracture, irregular and cubical; cross fracture, angular, and affording deposits of charcoal. Streak, dull black. On the fire, agglutinates, swells, and partially fuses. Ash, pale cream colour. Specific gravity, 1·259.	29·4	70·6	·95 or 1·3 per cent.	·85	·40	·45
Gosforth.—Coal black, with shining layers. Fracture, irregular, inclining to cubical; cross fracture, cubical, with indications of charcoal. Streak, dull black. On the fire, swells and agglutinates. Ash, dull yellow. Specific gravity, 1·260.	35·	65·	1· or 1·5 per cent.	1·10	·50	·60

Name and General Character of Coal.	Volatile Matter.	Coke.	Ash in Coke.	Sulphur in		
				Coal.	Coke.	Volatile Matter.
NORTHUMBERLAND AND DURHAM: *Hastings Hartley*.—Jet black; laminated and splintry. Fracture, cubical, and slightly conchoidal; cross fracture, cubical and irregular. Streak, black, with a shade of brown. On the fire, crack and splits, with a trifling tendency to agglutinate. Ash, white, with red streaks. Specific gravity, 1·278.	36·6	63·4	2· or 3·1 per cent.	·95	·50	·45
West Hartley.—Jet black, with thin dull laminæ in the direction of the principal fracture, and slight deposits of charcoal. Fracture, slaty, cubical, inclining to conchoidal; cross fracture, cubical, with layers of carbonate of lime. Streak, brown black. On the fire, splits and opens, but does not fuse. Ash, dull cream colour. Specific gravity, 1·269.	35·8	64·2	4·7 or 7·3 per cent.	1·10	·60	·50
Leverson's Wallsend.—Colour, coal black, with shining layers. Fracture, cubical, and slightly slaty; cross fracture, cubical, with thin layers of iron pyrites. Streak, black and shining. On the fire, opens out, and agglutinates. Ash, brick red. Specific gravity, 1·278.	34·9	65·1	4·9 or 7·52 per cent.	1·30	·65	·65
South Peareth.—Dull black, with bright laminæ, coarse grained. Fracture, irregular, hackley, and inclining to cubical, with charcoal deposits; cross fracture, cubical. Streak, dull black. On the fire, intumesces and fuses partially. Ash, light yellow. Specific gravity, 1·266.	27·8	72·2	1·8 or 2·5 per cent.	1·20	·60	·60
Pelaw Main.—Colour, coal black, inclining to jet in variable layers. Fracture, cubical in all directions, with deposits of pyritic charcoal and carbonate of lime. On the fire, opens out, agglutinates, and intumesces. Ash, pale fawn colour. Specific gravity, 1·271.	30·3	69·7	2·60 or 3·7 per cent.	1·20	·70	·50
Pelton Main.—Colour, coal black, with shining layers. Fracture, in both directions cubical, with their deposits of carbonate of lime, and iron pyrites in the cross fracture. Streak, black and shining. On the fire, opens out, and fuses slightly. Ash, pale ochry yellow. Specific gravity, 1·270.	28·4	71·6	1·41 or 1·96 per cent.	1·10	·62	·48
New Pelton.—Colour, coal black, inclining to jet in layers. Fracture, slaty and cubical; cross fracture, irregular and cubical. Streak, black and shining. On the fire, opens out, fuses slightly, and intumesces. Ash, light brick red. Specific gravity, 1·265.	30·2	69·8	1·75 or 2·5 per cent.	1·10	·56	·54
South Tyne.—Shining black, with dull laminæ. Fracture, somewhat rhomboidal and irregular, with layers of charcoal and pyrites; cross fracture, angular. Streak, dull brownish black. On the fire, agglutinates and swells slightly. Ash, deep pink. Specific gravity, 1·339.	36·3	63·7	3·9 or 6·1 per cent.	2·10	1·10	1·00

Name and General Character of Coal.	Volatile Matter	Coke.	Ash in Coke.	SULPHUR IN		
				Coal.	Coke.	Volatile Matter.
NORTHUMBERLAND AND DURHAM: *Urpeth.*—Colour, coal black, with shining layers. Fracture, in all directions, cubical, with layers of carbonate of lime and iron pyrites on the cross fracture. Streak, black and shining. On the fire, opens out, swells, and fuses slightly. Ash, dull ochry yellow. Specific gravity, 1·271.	28·7	71·3	1·35 or 1·89 per cent.	1·00	·60	·40
Washington.—Colour, coal black, with shining layers. Fracture, in all directions, cubical and irregular. On the fire, opens out and fuses slightly. Streak, shining black. Ash, reddish yellow. Specific gravity, 1·260.	31·25	68·75	2·2 or 3·2 per cent.	1·30	·67	·63
SOMERSETSHIRE: *Nailsea.*—Dull black, coarse grained and fibrous. Fracture, hackley, inclining to rhomboidal, with numerous deposits of charcoal and iron pyrites; cross fracture, very irregular. Streak, brown black. On the fire, swells and fuses together. Ash, flesh-coloured, with red streaks. Specific gravity, 1·312.	34·9	65·1	3· or 4·6 per cent.	2·85	1·50	1·35
Radstock.—Colour, dull black. Structure, coarse grained and irregular. Fracture, slightly slaty; cross fracture, hackley, inclining to cubical, with layers of charcoal and iron pyrites, in cubical crystals; deposits of carbonate of lime. Streak, dull black. On the fire, alters but little, and intumesces slightly. Ash, dull yellow and floculent. Specific gravity, 1·275.	38·25	61·75	3·5 or 5·6 per cent.	3·10	1·80	1·30
STAFFORDSHIRE: *Apedale, 4 ft.*—Jet black, and in square, splintry fragments. Principal fracture, slaty, and slightly conchoidal; cross fracture, irregular, and numerous black bands. On the fire, decrepitates and opens; does not fuse. Ash, deep fawn colour. Specific gravity, 1·267.	40·	60·	·75 or 1·25 per cent.	·80	·38	·42
Apedale.—Jet black and laminated; splintry and hard. Principal fracture, slaty; cross fracture, irregular and angular, inclining to cubical. Streak, shining black. On the fire, crackles and burns freely, but remains open, without any symptoms of fusion. Ash, deep red. Specific gravity, 1·307.	38·5	61·5	1·9 or 3·1 per cent.	1·50	·82	·68
Heathern.—Colour, dull black, with shining layers. Fracture, slaty, containing deposits of charcoal; cross fracture, cubical, with thin layers of carbonate of lime and iron pyrites. On the fire, splits and fuses slightly. Ash, pale dull yellow. Specific gravity, 1·280.	42·9	57·1	1·75 or 3· per cent.	1·50	·70	·80
Silverdale, 10 ft.—Splintry and laminated. Principal fracture, slaty; cross fracture, angular, and slightly conchoidal. Streak, dull black. On the fire, splits and crackles slightly; does not fuse. Ash, dull red. Specific gravity, 1·301.	34·	66·	1·95 or 2·92 per cent.	1·30	·70	·60

Name and General Character of Coal.	Volatile Matter.	Coke.	Ash in Coke.	Sulphur in		
				Coal.	Coke.	Volatile Matter.
Staffordshire: *Woodshutts, 7 ft, Banbury.*—Fibrous and coarse grained. Principal fracture, hackley; cross fracture, irregular, inclining to rhomboidal, with layers of charcoal. On the fire, swells, but does not fuse. Ash, deep fawn colour. Specific gravity, 1·291.	40·2	59·8	1·22 or 2·03 per cent.	·90	·54	·36
Wales (North): *Ruabon, Top Yard Seam.*—Coal black, with shining layers; laminated. Fracture, slaty and cubical, with charcoal deposits; cross fracture, cubical. Streak, black. On the fire, swells and agglutinates. Ash, pale fawn colour. Specific gravity, 1·269.	37·5	62·5	2·5 or 4· per cent.	1·40	·80	·60
Ruabon, Main Coal.—Coal black and laminated. Fracture, irregular, inclining to cubical; cross fracture, foliated and splintry, with numerous layers of charcoal, and some indications of iron pyrites. Streak, dull black. On the fire, swells and fuses together. Ash, pale yellow. Specific gravity, 1·284.	41·5	58·5	1· or 1·7 per cent.	·85	·45	·40
Ruabon, Yard Seam.—Coal black, with dull laminæ. Fracture, irregular, inclining to cubical; cross fracture, angular, with considerable deposits of charcoal, and thin layers of carbonate of lime. Streak, dull black. On the fire, agglutinates and intumesces. Ash, fawn colour. Specific gravity, 1·271.	34·	66·	1·4 or 2·1 per cent.	1·10	·60	·50
Ruabon, Nant Seam.—Shining black, and in columnar concretions. Fracture, coarse and hackley, with charcoal deposits; cross fracture rhomboidal and crystalline, with thin layers of carbonate of lime. Streak, black. On the fire, agglutinates slightly and intumesces. Ash, cream colour. Specific gravity, 1·269.	37·9	62·1	1·4 or 2·2 per cent.	1·10	·70	·40
Wales (South): *Rhonda.*—Colour, coal black. Structure, coarse grained. Fracture, slaty and irregular; cross-fracture, hackley and angular. On the fire, swells slightly. Ash, light fawn colour. Specific gravity, 1·278.	22·8	77·2	2·7 or 3·5 per cent.	2·30	1·20	1·10
Rhonda, Low Main.—Colour, coal black; coarse grained and hackley. Fracture, irregular and slightly cubical; cross fracture, rough and angular. Streak, dull black. On the fire, intumesces and agglutinates feebly. Ash, pale red. Specific gravity, 1·280.	23·1	76·9	2·1 or 2·7 per cent.	2·20	1·10	1·10
Yorkshire: *Elsecar Low Pit.*—Colour, jet black, with dull layers. Structure, laminated. Fracture, slaty, inclining to cubical; cross fracture, cubical, with numerous deposits of charcoal, and traces of carbonate of lime. Streak, black. On the fire, swells and fuses with some intumescence. Ash, ochry yellow. Specific gravity, 1·258.	37·	63·	1·1 or 1·74 per cent.	1·20	·63	·57

Name and General Character of Coal.	Volatile Matter.	Coke.	Ash in Coke.	SULPHUR IN		
				Coal.	Coke.	Volatile Matter.
YORKSHIRE: *Grigleston Cliff, Soft.*—Colour, coal black. Structure, splintry, and in layers. Fracture, slaty, with bands of charcoal; cross-fracture, hackley and cubical, containing traces of carbonate of lime. Streak, black. On the fire, alters but little, and does not fuse or decrepitate. Ash, brick red. Specific gravity, 1·255.	35·6	64·4	1·6 or 2·48 per cent.	1·40	·75	·65
Mortomly.—Coal black, with shining layers, in splintry fragments. Fracture, laminated and cubical; cross fracture, cubical and irregular. Streak, dull black. On the fire, splits and opens. but afterwards agglutinates and intumesces. Ash, light fawn colour. Specific gravity, 1·220.	37·	63·	1·6 or 2·5 per cent.	1·10	·60	·50
Silkston, No. 1.—Colour, jet black. Structure, laminated and prismatic. Fracture, slaty; cross fracture, cubical and irregular, with deposits of carbonate of lime and charcoal. Streak, black and shining. On the fire, splits and fuses slightly. Ash, fawn colour. Specific gravity, 1·260.	34·1	65·9	2·78 or 4·2 per cent.	1·30	·80	·50
Silkston, No. 2.—Colour, jet black. Structure, uniform. Fracture, in all directions, cubical; traces of carbonate of lime and charcoal. Streak, brownish black. On the fire, fuses slightly, and intumesces. Ash, yellowish fawn colour. Specific gravity, 1·259.	38·	62·	2·55 or 4·1 per cent.	1·10	·60	·50
Silkston, No. 3.—Colour, coal black. Structure, laminated and prismatic. Fracture, slaty and columnar; cross fracture, irregular and cubical, with deposits of charcoal and traces of carbonate of lime. Streak, black. On the fire, alters little. Ash, pale fawn colour. Specific gravity, 1·262.	35·2	64·8	2·8 or 4·1 per cent.	1·45	·75	·70
Soap House Pit.—Dull black and slaty, with impressions of leaves. Fracture, rough and hackley, inclining to conchoidal; cross fracture, irregular and angular. On the fire, splits, and then agglutinates and swells. Streak, dull brownish black. Ash, light brown. Specific gravity, 1·258.	35·	65·	·8 or 1·2 per cent.	·75	·40	·35
Woodthorpe.—Compact, black and uniform in appearance; resembles cannel coal. Fracture, conchoidal; cross fracture, splintry and conchoidal, with layers of carbonate of lime. Streak, black. On the fire, decrepitates slightly and splits, but does not fuse. Ash, dirty pink. Specific gravity, 1·347.	33·1	66·9	10·5 or 16·6 per cent.	1·20	·70	·50
FRANCE: *Denain (Valenciennes).*—Colour, coal black. Structure, coarse grained and slightly fibrous. Fracture, irregular, inclining to cubical, with layers of charcoal; cross fracture, hackley and angular, with traces of iron pyrites. On the fire, but little affected, intumesces and agglutinates. Ash, fawn colour. Specific gravity, 1·265.	29·9	70·1	6· or 8·57 per cent.	2·4	1·30	1·10

LOSS OF ILLUMINATING POWER.

Coal gas is depreciated in illuminating power, to a greater or lesser degree, in travelling through the mains and service-pipes, owing to the liability, especially in cold weather, of the hydrocarbons to be condensed and deposited.

TABLE

Showing the Composition of the Different Varieties of Coal.

Name.	Carbon.	Hydrogen.	Oxygen.	Nitrogen.	Ashes.	Authority.
Caking coal	87·952	5·239	3·806	. .	1·393	Richardson.
Cherry coal	83·025	5·250	8·566	. .	1·549	
Splint coal	82·924	5·491	8·847	. .	1·128	Thompson.
Cannel coal	76·25	5·50	13·83	1·61	2·81	Ditto.
Anthracite	92·56	3·33	2·53	. .	1·58	Richardson.

TABLE

Giving the Result of the Distillation for Gas and for Oil, of One Ton of Newcastle Cannel Coal. (Gesner.)

Distilled for Gas, at 1000° to 1200° Fahr.

PRODUCTS.	
Coal gas	7450 cub. ft.
Coal tar	18½ gals.
Coke	1200 lbs.
PRODUCTS OF THE COAL TAR.	
Benzole	3 pints.
Coal tar naphtha . . .	3 gals.
Heavy oil, naphthaline, &c.	9 gals.
Total	12⅜ gals.

Distilled for Oil, at 750° to 800° Fahr.

PRODUCTS.	
Gas	1400 cub. ft.
Crude oil	68 gals.
Coke	1280 lbs.
PRODUCTS OF THE CRUDE OIL.	
Eupion	2 gals.
Lamp oil	22·5 gals.
Heavy oil and paraffin . .	24 gals.
Total	48·5 gals.

RETORTS.

Clay Retorts are usually about 3½ inches thick, the flange or mouthpiece being 1½ inch thicker.

Iron Retorts should be worked at a cherry-red heat, ranging from 1650° to 1830°; clay retorts at a bright orange and white heat, from 2190° to 2370°.

The duration of an iron retort is equal to the production of about 700,000 or 800,000 cubic feet of gas; of an ordinary D clay retort, about 1,500,000 cubic feet.

COLOURS

Expressive of the corresponding High Temperatures reduced to Fahrenheit. (*Becquerel.*)

	Fahr.		Fahr.
Faint red	960°	Orange	2010°
Dull red	1290°	Bright orange	2190°
Brilliant red	1470°	White heat	2370°
Cherry red	1650°	Bright white heat . . .	2550°
Bright cherry red . . .	1830°		

THE CONDENSER.

The Temperature of Coal Gas when it leaves the Retorts.

The low temperature of the gas when it leaves the retorts, after having been exposed to the action of intense heat (from 1600° to 2400°), requires some explanation. If the same quantity of air were to pass in and out of the retorts in the same time, it would be heated to at least 600°. This is shown in the heating of air for hot-blast furnaces, in which operation a million cubic feet of air are heated in one hour to the melting point of lead. But the gas that passes from a retort at the rate of only 400 cubic feet an hour, after exposing a large surface directly to the action of intense heat, has not a higher temperature than 120° or 130°. The cause of this difference is to be attributed to the absorption of heat by the gas when assuming an aëriform condition. The effect that takes place is similar to what occurs during the formation of steam in an open boiler. To impart to the steam an elastic, invisible, and expanded form, a large amount of heat is required, which is absorbed from the boiling water and retained in a latent state; neither the water nor the steam becoming hotter than the boiling point, however hot the fire may be.—*Clegg, 4th Ed., p.* 174.

Rules for Calculating the Area required for Condensation.

The different states in which crude gas enters the condensers make it impossible to give any fixed rule for the determination of the area of the exposed surface. It may be dangerous even to venture on a general one; but it may be stated from experience that a surface of 150 square feet for every 1000 cubic feet per hour is about sufficient when the stratum of gas has not exceeded 3 inches in thickness, and this without the application of a water shower.—*Clegg, 4th Ed., p.* 173.

The original condensers designed by Mr. Croll for the Great Central Gas Company, and which afterwards proved to be amply sufficient, had a less area than that given above. The superficial area of these was 4 feet per 1000 cubic feet maximum production per diem, or at the rate of 96 square feet for every 1000 cubic feet of gas produced per hour.

Another rule adopted by some gas managers is that it requires 10 square feet of condensing surface to cool 1 cubic foot of gas per minute.

TABLE

Exhibiting the Loss of Illuminating Property in Coal Gas on Exposure to the Temperature of Freezing Point, 32° *Fahr.*

Name of Gas.	Hydrocarbons condensed from 1000 Cubic Feet of Gas on Exposure to a Cold of 32° Fahr.
Boghead cannel	4·42 cubic feet.
Ince Hall ditto	0·37 „
Methyl ditto	0·33 „

From the above it appears that the richest gas suffers the greatest deterioration on being subjected to cold.

TABLE

Showing the Relative Effects of Water and Air as Cooling Agents for the Condensation of Gas.

Excess of Temperature in the Gas.	Quantity of Heat lost by a Square Unit of Exterior Pipe Surface. When radiating in Air.	When plunged in Water.
For an excess of 10°	8 ..	88
„ „ 20°	18 ..	266
„ „ 30°	29 ..	5,353
„ „ 40°	40 ..	8,944
„ „ 50°	53 ..	13,437

TABLE

Comparing Fahrenheit's, Reaumur's, and the Celsius or Centigrade Thermometers.

Fahr.	Reau.	Cent.	Fahr.	Reau.	Cent.	Fahr.	Reau.	Cent.	Fahr.	Reau.	Cent.
212	80·0	100·0	153	53·7	67·2	95	28·0	35·0	37	2·2	2·7
211	79·5	99·4	152	53·3	66·6	94	27·5	34·4	36	1·7	2·2
210	79·1	98·8	151	52·8	66·1	93	27·1	33·8	35	1·3	1·6
209	78·6	98·3	150	52·4	65·5	92	26·6	33·3	34	0·8	1·1
208	78·2	97·7	149	52·0	65·0	91	26·2	32·7	33	0·4	0·5
207	77·7	97·2	148	51·5	64·4	90	25·7	32·2	32	0·0	0·0
206	77·3	96·6	147	51·1	63·8	89	25·3	31·6	31	— 0·4	— 0·5
205	76·8	96·1	146	50·6	63·3	88	24·8	31·1	30	— 0·8	— 1·1
204	76·4	95·5	145	50·2	62·7	87	24·4	30·5	29	— 1·3	— 1·6
203	76·0	95·0	144	49·7	62·2	86	24·0	30·0	28	— 1·7	— 2·2
202	75·5	94·4	143	49·3	61·6	85	23·5	29·4	27	— 2·2	— 2·7
201	75·1	93·8	142	48·8	61·1	84	23·1	28·8	26	— 2·6	— 3·3
200	74·6	93·3	141	48·4	60·5	83	22·6	28·3	25	— 3·1	— 3·8
199	74·2	92·7	140	48·0	60·0	82	22·2	27·7	24	— 3·5	— 4·4
198	73·7	92·2	139	47·5	59·4	81	21·7	27·2	23	— 4·0	— 5·0
197	73·3	91·6	138	47·1	58·8	80	21·3	26·6	22	— 4·4	— 5·5
196	72·8	91·1	137	46·6	58·3	79	20·8	26·1	21	— 4·8	— 6·1
195	72·4	90·5	136	46·2	57·7	78	20·4	25·5	20	— 5·3	— 6·6
194	72·0	90·0	135	45·7	57·2	77	20·0	25·0	19	— 5·7	— 7·2
193	71·5	89·4	134	45·3	56·6	76	19·5	24·4	18	— 6·2	— 7·7
192	71·1	88·8	133	44·8	56·1	75	19·1	23·8	17	— 6·6	— 8·3
191	70·6	88·3	132	44·4	55·5	74	18·6	23·3	16	— 7·1	— 8·8
190	70·2	87·7	131	44·0	55·0	73	18·2	22·7	15	— 7·5	— 9·5
189	69·7	87·2	130	43·5	54·4	72	17·7	22·2	14	— 8·0	—10·0
188	69·3	86·6	129	43·1	53·8	71	17·3	21·6	13	— 8·4	—10·5
187	68·8	86·1	128	42·6	53·3	70	16·8	21·1	12	— 8·8	—11·1
186	68·4	85·5	127	42·2	52·7	69	16·4	20·5	11	— 9·3	—11·6
185	68·0	85·0	126	41·7	52·2	68	16·0	20·0	10	— 9·7	—12·2
184	67·5	84·4	125	41·3	51·6	67	15·5	19·4	9	—10·2	—12·7
183	67·1	83·8	124	40·8	51·1	66	15·1	18·8	8	—10·6	—13·3
182	66·6	83·3	123	40·4	50·5	65	14·6	18·3	7	—11·1	—13·8
181	66·2	82·7	122	40·0	50·0	64	14·2	17·7	6	—11·5	—14·4
180	65·7	82·2	121	39·5	49·4	63	13·7	17·2	5	—12·0	—15·0
179	65·3	81·6	120	39·1	48·8	62	13·3	16·6	4	—12·4	—15·5
178	64·8	81·1	119	38·6	48·3	61	12·8	16·1	3	—12·8	—16·1
177	64·4	80·5	118	38·2	47·7	60	12·4	15·5	2	—13·3	—16·6
176	64·0	80·0	117	37·7	47·2	59	12·0	15·0	1	—13·7	—17·2
175	63·5	79·4	116	37·3	46·6	58	11·5	14·4	0	—14·2	—17·7
174	63·1	78·8	115	36·8	46·1	57	11·1	13·8	— 1	—14·6	—18·3
173	62·6	78·3	114	36·4	45·5	56	10·6	13·3	— 2	—15·1	—18·8
172	62·2	77·7	113	36·0	45·0	55	10·2	12·7	— 3	—15·5	—19·4
171	61·7	77·2	112	35·5	44·4	54	9·7	12·2	— 4	—16·0	—20·0
170	61·3	76·6	111	35·1	43·8	53	9·3	11·6	— 5	—16·4	—20·5
169	60·8	76·1	110	34·6	43·3	52	8·8	11·1	— 6	—16·8	—21·1
168	60·4	75·5	109	34·2	42·7	51	8·4	10·5	— 7	—17·3	—21·6
167	60·0	75·0	108	33·7	42·2	50	8·0	10·0	— 8	—17·7	—22·2
166	59·5	74·4	107	33·3	41·6	49	7·5	9·4	— 9	—18·2	—22·7
165	59·1	73·8	106	32·8	41·1	48	7·1	8·8	—10	—18·6	—23·3
164	58·6	73·3	105	32·4	40·5	47	6·6	8·3	—11	—19·1	—23·8
163	58·2	72·7	104	32·0	40·0	46	6·2	7·7	—12	—19·5	—24·4
162	57·7	72·2	103	31·5	39·4	45	5·7	7·2	—13	—20·0	—25·0
161	57·3	71·6	102	31·1	38·8	44	5·3	6·6	—14	—20·4	—25·5
160	56·8	71·1	101	30·6	38·3	43	4·8	6·1	—15	—20·8	—26·1
159	56·4	70·5	100	30·2	37·7	42	4·4	5·5	—16	—21·3	—26·6
158	56·0	70·0	99	29·7	37·2	41	4·0	5·0	—17	—21·7	—27·2
157	55·5	69·4	98	29·3	36·6	40	3·5	4·4	—18	—22·2	—27·7
156	55·1	68·8	97	28·8	36·1	39	3·1	3·8	—19	—22·6	—28·3
155	54·6	68·3	96	28·4	35·5	38	2·6	3·3	—20	—23·1	—28·8
154	54·2	67·7									

To Reduce Degrees of Temperature of the Centigrade Thermometer, and of that of Reaumur, to Degrees of Fahrenheit's Scale, and conversely.

Rule 1.—Multiply the centigrade degrees by 9, and divide the product by 5; or multiply the degrees of Reaumur by 9, and divide the product by 4; then add 32 to the quotient in either case, and the sum is the degrees of temperature on Fahrenheit's scale.

Rule 2.—From the number of degrees on Fahrenheit's scale subtract 32, multiply the remainder by 5 for centigrade degrees, or by 4 for those of Reaumur's scale, and the product in either case, being divided by 9, will give the temperature required.

PURIFIERS.

In determining the size of purifiers, where either dry lime or oxide of iron is intended to be used, it is of the utmost importance to provide a liberal surface area. One of the greatest sources of discomfort to a gas manager is to have a set of purifiers so cramped and confined in their area as to be incapable of doing the work required in an efficient manner.

It is stated in Clegg (4th Ed., p. 200) that "the usual calculation with gas-makers in France is, that an area of about 1 foot is required for every 250 lbs. of coal carbonized in 24 hours, each purifier being supposed to contain three sieves, which would amount to about 3 square yards of surface to each ton of coal carbonized." This is not very explicit; but if it is meant that there should be 3 square yards of surface *in each of the four purifiers*, to every ton of coal carbonized in 24 hours, the calculation is a reasonable one.

The same also states "that, for every 150 cubic feet of gas per hour which can be generated, each purifier should present one superficial foot of surface." This allowance is absurdly small, and in practice, with anything near the maximum production, would be found altogether inadequate.

The rule (as follows) given in Hughes (3rd Ed., p. 158) allows 63 per cent. more space than the above, supposing five sieves to each purifier, and is much to be preferred.

Rule for Determining the Capacity of Dry-Lime Purifiers.

Allow one superficial yard of sieve for every 1000 cubic feet of gas produced per diem.

Taking this rule as a basis, a Works producing a maximum of 220,000 cubic feet of gas per day of 24 hours, will require four purifiers, each 10 feet square, and having five tiers of sieves each.

Another convenient rule, agreeing very nearly with the above, is to—

Allow 10 square yards of sieve for every ton of coal and cannel that can be carbonized in 24 hours.

Number of Tiers of Sieves, and Depth of Purifying Material.

In dry-lime purifiers, five layers of sieves are to be preferred to either a greater or lesser number. The lime spread upon their surface should not be more than 2½ inches in depth.

When oxide of iron is used, the layers may be two in number, and the material 6 or 7 inches deep on each.

Depth of Water-Lute or Seal for Purifier Lids.

The evils of limited area in purifiers are aggravated by having a shallow seal to the lids and centre-valve. The seal for the lids should never be less than 18 inches deep, especially where the pressure is increased by the use of Telescopic Holders. The dry centre-valve, faced to fit gas-tight, is much preferable to the old hydraulic valve.

Size of the Connecting-Pipes of Purifiers.

The rule is to make their diameter, *in inches*, equal, as near as possible, to the square root, *in feet*, of the area of the purifiers.

Thus, purifiers 10 feet square, giving an area of 100 square feet, have connecting-pipes 10 inches in diameter; and purifiers 16 feet by 12 feet, having an area of 192 square feet, have their connecting-pipes 14 inches in diameter.

GOOD LIME FOR PURIFYING

Is known by its quality of keeping loose when put into the purifier—not caking in a mass.

SCRUBBERS.

Rule for Determining the Size of Scrubbers.

For every 1000 cubic feet of gas produced in 24 hours, one cubic foot of wet scrubbing material is required.—*Clegg, 4th Ed , p.* 219.

MILLBOARD FOR JOINTING FLANGES, LIDS, ETC.

Millboard, steeped for a short time in warm water to render it pliable, and coated with red or white lead, is far superior to cement for attaching flanges, lids, &c. It makes a better and more durable joint, and in the case of flanges is not cracked, as cement often is, by the settling of the pipes in the ground.

RINGS FOR JOINTING

Are best made with ¼-inch or ⅜-inch lead pipe (the ends being soldered together evenly), covered with flax well smeared with red lead or paint. The pipe must not be beaten flat, but left round, so that when the joint is screwed up it may bed into any irregularities in the surfaces.

RED LEAD

Should always be mixed with boiled linseed oil. Other oil can be made to answer, but not near so well.

BOILED LINSEED OIL

Should never be put into a vessel which previously contained sweet oil, without cleaning the vessel thoroughly. One tea-spoonful of the latter would prevent the former from drying when used with paint.

TEMPORARY VALVE-BUSH.

In the event of a valve-bush suddenly stripping its thread, and no tools at hand for making another, a temporary bush may be made of block-tin, by casting it on the thread of the valve-spindle.

MOLTEN LEAD,

If heated to redness, will fly when poured upon a wet or damp surface.

RETORT-HOUSE SHOVELS.

Shovels with riveted handles are not good in or about a retort-house. The heat soon causes the wood to dry in, and the rivets give way and become jagged, lacerating the hands of the men who use them. Socketed handles are much the best.

A good handy sized shovel for charging retorts of the ordinary size is one 16 inches long by 12 inches wide. Firing shovels (for coke) are best made an inch wider. Both should be well turned up at the sides.

ASCENSION-PIPES

Fill up with tar and pitch occasionally, so that even the drill will scarcely relieve them. Let such stand off (if they can be spared) for twelve hours, slackening the retort-lid, and making sure that the plug or flange is removed from the top. The heated air rushing through them will thoroughly clear them of the obstruction.

BRICKS AND BRICKWORK.

Usual dimensions of bricks—
9 inches long, 4½ inches broad, 2¾ inches deep.
32 bricks laid flat will pave one square yard.
48 ,, on edge ,, ,,
Number of bricks in a cubic yard, 384.

A rod of brickwork measures 16½ feet × 16½ feet × 1⅛ foot = 306 cubic feet, or 11⅓ cubic yards.

A rod of brickwork = 272 superficial feet, 1½ brick thick.

To reduce brickwork from cubic feet to superficial feet of the standard thickness of 13½ inches, deduct one-ninth.

To reduce brickwork from superficial feet of 9 inches thick to the standard thickness of 13½ inches, deduct one-third.

PUDDLE.

Clay puddle should always be prepared before putting it into the trench. One-third soil to two-thirds clay, makes excellent puddle; it does not crack so easily as when clay alone is used. A cubic yard of puddle weighs about 2 tons.

WEIGHT OF VARIOUS SUBSTANCES.

Name of Substance.	Weight per Cubic Foot in lbs. Avoirdupois.	Name of Substance.	Weight per Cubic Foot in lbs. Avoirdupois.
Air	0·080728	Brickwork	112
Alcohol, pure	49·38	Carbonic acid	0·12344
Ash (timber)	47	Cement, Portland	78
Asphalte	156	,, Roman	60
Basalt	187	Chalk	128
Beech	43	Charcoal, oak	21
Birch	44	Clay	120
Bitumen	62	,, puddle	160
Boxwood	60	Coal, anthracite	80
Brass, cast	515	,, bituminous	75
,, wire	530	Coke, from coking-ovens	50
Brick	130	,, from gas-works	35

Name of Substance.	Weight per Cubic Foot in lbs. Avoirdupois.
Concrete	120
Copper, cast	540
„ sheet and wire	550
Earth, loam	100
Ebony	75
Elm	35
Fir, red pine and spruce	35
„ American	29
„ larch	34
Flint	164
Freestone	140
Glass, crown	156
„ plate	180
„ flint	187
Gold, pure	1210
„ standard	1108
Granite	168
Gravel	115
Gun metal	549
Gypsum	144
Hydrogen	0·005592
Iron, cast	448
„ wrought	480
Lead	712
Limestone, lias	156
„ magnesian	178
Lime, quick	53
Mahogany, Honduras	40
„ Spanish	45
Maple	49
Marble	170
Marl	118
Masonry	140
Mercury	849
Mortar	110
Mud	100
Naphtha	53
Nitrogen	0·078596
Oak, English	50
„ American, red	54
Oil, linseed	59
„ olive	57
„ whale	58
Olefiant Gas	0·0795
Oxygen	0·089256
Paving	160
Peat	80
Petroleum	55
Pitch	72
Platinum, pure	1220
„ hammered	1280
„ wire	1300
Quartz	165
Sand, damp	118
„ dry	90
Sandstone	145
Shale	162
Shingle	95
Silver, pure	655
„ standard	658
Slate	180
Steel	490
Sulphur	125
Sycamore	37
Tar	65
Tin	460
Trap	170
Water, pure	62·425
„ sea	64·05
Willow	28
Yew	50
Zinc	440

SUBSTANTIAL WORK *v.* ORNAMENT.

Capital is best spent on substantial tanks and apparatus. Ornament should be a secondary consideration.

RECEIPT FOR COATING A GASHOLDER.

1 gallon of tar.
½ lb. of asphalte.
⅛ lb. of tallow.
1 pint of coal naphtha.

Mix the tar and the asphalte together, and heat them up to the boiling point, add the tallow and the naphtha, and lay the mixture on to the holder before it cools.

THE GASHOLDER,

Or holders, should, as a general rule, be of sufficient capacity to contain the maximum production in 24 hours. An excess in capacity is not necessary.

TABLE

Giving the Capacity of Gasholders *in Cubic Feet for every Foot in Depth, and from* 20 *to* 150 *Feet in Diameter, advancing Half a Foot at a Time.*

Diameter of Holder in Feet.	Capacity in Cub. Ft. for every Foot in Depth of Holder.	Diameter of Holder in Feet.	Capacity in Cub. Ft. for every Foot in Depth of Holder.	Diameter of Holder in Feet.	Capacity in Cub. Ft. for every Foot in Depth of Holder.	Diameter of Holder in Feet.	Capacity in Cub. Ft. for every Foot in Depth of Holder.	Diameter of Holder in Feet.	Capacity in Cub. Ft. for every Foot in Depth of Holder.
20	314·16	46½	1698·23	72½	4128·25	98½	7620·14	124½	12173·89
20½	330·06	47	1734·94	73	4185·39	99	7697·70	125	12271·87
21	346·36	47½	1772·05	73½	4242·92	99½	7775·65	125½	12370·24
21½	363·05	48	1809·56	74	4300·85	100	7854·00	126	12469·01
22	380·13	48½	1847·45	74½	4359·16	100½	7932·73	126½	12568·16
22½	397·60	49	1885·74	75	4417·87	101	8011·86	127	12667·71
23	415·47	49½	1924·42	75½	4476·97	101½	8091·38	127½	12767·65
23½	433·73	50	1963·50	76	4536·47	102	8171·30	128	12867·99
24	452·39	50½	2002·96	76½	4596·35	102½	8251·60	128½	12968·72
24½	471·43	51	2042·82	77	4656·63	103	8332·30	129	13069·84
25	490·87	51½	2083·07	77½	4717·30	103½	8413·40	129½	13171·35
25½	510·70	52	2123·72	78	4778·37	104	8494·88	130	13273·26
26	530·93	52½	2164·75	78½	4839·83	104½	8576·76	130½	13375·55
26½	551·54	53	2206·18	79	4901·68	105	8659·03	131	13478·24
27	572·55	53½	2248·01	79½	4963·92	105½	8741·69	131½	13581·33
27½	593·95	54	2290·22	80	5026·56	106	8824·75	132	13684·80
28	615·75	54½	2332·83	80½	5089·58	106½	8908·20	132½	13788·67
28½	637·94	55	2375·83	81	5153·00	107	8992·04	133	13892·94
29	660·52	55½	2419·22	81½	5216·82	107½	9076·27	133½	13997·59
29½	683·49	56	2463·01	82	5281·02	108	9160·90	134	14102·64
30	706·86	56½	2507·19	82½	5345·62	108½	9245·92	134½	14208·08
30½	730·61	57	2551·76	83	5410·62	109	9331·33	135	14313·91
31	754·76	57½	2596·72	83½	5476·00	109½	9417·14	135½	14420·14
31½	779·31	58	2642·08	84	5541·78	110	9503·84	136	14526·75
32	804·24	58½	2687·83	84½	5607·95	110½	9589·93	136½	14633·76
32½	829·57	59	2733·97	85	5674·51	111	9676·91	137	14741·17
33	855·30	59½	2780·51	85½	5741·47	111½	9764·28	137½	14848·96
33½	881·41	60	2827·44	86	5808·81	112	9852·05	138	14957·15
34	907·92	60½	2874·76	86½	5876·55	112½	9940·21	138½	15065·73
34½	934·82	61	2922·47	87	5944·69	113	10028·77	139	15174·71
35	962·11	61½	2970·57	87½	6013·21	113½	10117·71	139½	15284·08
35½	989·80	62	3019·07	88	6082·13	114	10207·05	140	15393·84
36	1017·87	62½	3067·96	88½	6151·44	114½	10296·79	140½	15503·99
36½	1046·35	63	3117·25	89	6221·15	115	10386·91	141	15614·53
37	1075·21	63½	3166·92	89½	6291·25	115½	10477·43	141½	15725·47
37½	1104·46	64	3216·99	90	6361·74	116	10568·34	142	15836·80
38	1134·11	64½	3267·46	90½	6432·62	116½	10659·64	142½	15948·52
38½	1164·15	65	3318·31	91	6503·89	117	10751·34	143	16060·64
39	1194·59	65½	3369·56	91½	6575·56	117½	10843·42	143½	16173·15
39½	1225·42	66	3421·20	92	6647·62	118	10935·90	144	16286·05
40	1256·64	66½	3473·23	92½	6720·07	118½	11028·78	144½	16399·34
40½	1288·25	67	3525·66	93	6792·92	119	11122·04	145	16513·03
41	1320·25	67½	3578·47	93½	6866·16	119½	11215·70	145½	16627·11
41½	1352·65	68	3631·68	94	6939·79	120	11309·76	146	16741·58
42	1385·44	68½	3685·29	94½	7013·81	120½	11404·20	146½	16856·45
42½	1418·62	69	3739·28	95	7088·23	121	11499·04	147	16971·70
43	1452·20	69½	3793·67	95½	7163·04	121½	11594·28	147½	17087·35
43½	1486·17	70	3848·46	96	7238·24	122	11689·89	148	17203·40
44	1520·53	70½	3903·63	96½	7313·84	122½	11785·90	148½	17319·83
44½	1555·28	71	3959·20	97	7389·82	123	11882·31	149	17436·66
45	1590·43	71½	4015·16	97½	7466·20	123½	11979·11	149½	17553·88
45½	1625·97	72	4071·51	98	7542·98	124	12076·31	150	17671·50
46	1661·90								

TELESCOPIC HOLDERS,

In winter, are apt to be thrown out of order by the ice getting between the top and bottom lifts. When the bottom half is down, the upper half, in its progress downward, rolls the ice and snow in the lute into hard lumps, often throwing the holder out of the square. Great care should be taken to keep the water-lute clear.

Another important precaution is to keep the top or crown of the holder clear of snow, especially when the latter is drifting. Nothing will sooner break down a holder than allowing a mass of snow to collect and lie on one side.

The oscillation of a telescopic holder during strong winds is greater when uncupped than when both lifts are joined. Its liability to damage from wind is also greater when the bottom lift is down.

TABLE OF THE WEIGHTS OF GASHOLDERS

In Pounds for every One-tenth of an Inch Maximum Pressure, and from 20 to 200 Feet in Diameter.

Diameter of Gasholder in Feet.	Weight in lbs. for each One-tenth of an Inch Pressure.	Diameter of Gasholder in Feet.	Weight in lbs. for each One-tenth of an Inch Pressure.	Diameter of Gasholder in Feet.	Weight in lbs. for each One-tenth of an Inch Pressure.	Diameter of Gasholder in Feet.	Weight in lbs. for each One-tenth of an Inch Pressure.
20	164	53	1149	86	3026	119	5793
21	181	54	1193	87	3097	120	5891
22	198	55	1238	88	3168	121	5990
23	217	56	1283	89	3241	122	6089
24	236	57	1329	90	3314	123	6189
25	256	58	1376	91	3388	124	6290
26	277	59	1424	92	3463	125	6392
27	298	60	1473	93	3538	126	6495
28	321	61	1522	94	3615	127	6598
29	344	62	1573	95	3692	128	6703
30	368	63	1624	96	3770	129	6808
31	393	64	1676	97	3849	130	6914
32	419	65	1729	98	3929	131	7021
33	446	66	1782	99	4010	132	7128
34	473	67	1837	100	4091	133	7237
35	501	68	1892	101	4173	134	7346
36	530	69	1948	102	4256	135	7456
37	560	70	2005	103	4340	136	7567
38	591	71	2062	104	4425	137	7678
39	622	72	2121	105	4510	138	7791
40	655	73	2180	106	4597	139	7904
41	688	74	2240	107	4684	140	8018
42	722	75	2301	108	4772	141	8133
43	757	76	2363	109	4861	142	8249
44	792	77	2426	110	4950	143	8366
45	828	78	2489	111	5041	144	8483
46	866	79	2553	112	5132	145	8601
47	904	80	2618	113	5224	146	8720
48	943	81	2684	114	5317	147	8840
49	982	82	2751	115	5410	148	8961
50	1023	83	2818	116	5505	149	9083
51	1064	84	2887	117	5600	150	9205
52	1106	85	2956	118	5696	200	16,364

To Ascertain the Weight of a Gasholder by the above Table, the Diameter and Maximum Pressure being known.

Rule.—Multiply the number of lbs. standing opposite to the diameter by the pressure in tenths of an inch.

Example.—What is the weight of a gasholder 78 feet in diameter, giving a maximum pressure of 32/10ths?

2489 × 32 = 79,648 lbs., weight of gasholder.

To Ascertain, by the above Table, the Pressure which a Gasholder will give, the Diameter and Weight being known.

Rule.—Divide the weight in lbs. of the gasholder by the weight given opposite to the diameter.

Example.—What pressure will a gasholder give whose weight is 32,075, and diameter 56 feet?

32,075 ÷ 1283 = 25/10ths, maximum pressure of gasholder.

The figures given in the above table are based on the weight of a cubic foot of water —viz., 62·5 lbs., a column 1/10th of an inch high being ·52083 lbs., or the 120th part. Thus, if the area of the holder in feet (obtained by squaring the diameter and multiplying by ·7854) be multiplied by 62·5, the weight of a cubic foot of water in lbs., and divided by 120, the number of 10ths of an inch in a foot, the product will be the weight of the holder in lbs. for each 1/10th of an inch maximum pressure.

Or thus: The area of a circle is to the square of its diameter as ·7854 is to 1; hence the weight of a gasholder in lbs., to give 1/10th of an inch pressure, is to the square of its diameter in feet as ·52083 × ·7854 is to unity; or, which is the same thing, as ·4091 is to unity. So to ascertain the weight of a holder, say, 100 feet diameter, giving a maximum pressure of 35/10ths—

100^2 × 35 × ·4091 = 143,185 lbs., weight of gasholder.

DIMENSIONS AND STRENGTH OF THE PRINCIPAL MATERIALS IN GASHOLDERS IN ACTUAL WORKING.

Single Gasholder.

Diameter, 30 ft. Depth, 15 ft.

Roof sheets, No. 17 B. wire gauge.
Side sheets, No. 18 B. wire gauge.
Inlet and outlet pipes, 6 in. diam.

Single Gasholder.

Diameter, 35 ft. Depth, 12 ft.

Roof sheets, No. 15 B. wire gauge.
Side sheets, No. 16 B. wire gauge.
Crown plate, 3 ft. 6 in. diam., ⅜ in. thick.
4 main and 4 secondary bars, of 3 in. T-iron.
Top and bottom curbs, of 3 in. angle iron.
4 columns, 13 ft. 6 in. long; diam. at base, 6 in.; at top, 5½ in.
4 holding-down bolts to each column, 4 ft. long, 1 in. round iron.

Single Gasholder.

Diameter, 36 ft. Depth, 12 ft.

Roof sheets, No. 17 B. wire gauge.
Side sheets, No. 18 B. wire gauge.

Single Gasholder.

Diameter, 40 ft. Depth, 15 feet.

Crown plate, 3 ft. 5 in. diam., ⅜ in. thick.
Roof sheets, No. 14 B. wire gauge.
Side sheets, top and bottom tiers, No. 14 B. wire gauge; all the rest, No. 15 B. wire gauge.
Rivets for sheets, ¼ in. diam., 1 in. apart, centre to centre.
Rivets for top curb, ½ in. diam., 1½ in. apart, centre to centre.
Rivets for bottom curb, ½ in. diam., 6 in. apart, centre to centre.
Centre-pipe of cast iron, 6 ft. long, 4 in. diam.
Truss cup, cast iron, 2 ft. 6 in. diam.
12 main bars, T-iron, 2½ × 2½ × ⅜ in.
4 vertical stays, T-iron, 3 × 2½ × ⅜ in.
Top curb, angle iron, 3 × 3 × ⅜ in.
Bottom curb, angle iron, 3 × 3 × ⅜ in.
4 columns, 17 ft. long; diam. at base 9 in.; diam. at top, 7 in.
3 holding-down bolts to each column, 7 ft. long each, 1¼ in diam.
Girders of T-iron, 3 × 4 × ½ in., trussed.
Balance-weights, 40 cwt.; ½ in. chains.

Single Gasholder.

Diameter, 44 ft. 6 in. Depth, 20 ft.

Rise of crown, 1 ft. 9 in.
Crown plate, 3 ft. 6 in. diam., ⅜ in. thick.
Roof sheets, inner and outer circles, No. 12 B. wire gauge; all the rest, No. 14.
Side sheets, top and bottom tiers, No. 12 B. wire gauge; the rest, No. 17.
Rivets for Nos. 12 and 14 sheets, 5-16th in. diam.; for No. 16 sheets, ¼ in. diam.
5 main and 5 secondary bearing bars, of T-iron, 3 × 3 × ⅜ in.
5 columns, 22 ft. long, 7 in. diam. at base, 5¾ diam. at top; metal 11-16ths. thick.
4 holding-down bolts, 16 ft. long, 1¼ in. square iron.

Single Gasholder.

Diameter, 50 ft. Depth, 20 ft.

Rise of crown, 12 in.
Roof sheets, No. 14 B. wire gauge.
Side sheets, No. 15 B. wire gauge.
Rivets, 1 in. apart, centres.
Top and bottom curbs, 3 in. angle iron.
8 vertical bars.
8 columns, 26 ft. long, cast in two lengths each; 12 in. diam. at base, 6 in. diam. at top.
Inlet-pipe, 9 in. diam.
Outlet-pipe, 10 in. diam.

Single Gasholder.

Diameter, 50 ft. Depth, 16 ft.

Rise of crown, 2 ft. 6 in.
Crown plate, 3 ft. diam., ¼ in. thick.
Roof sheets, inner and outer circles, No. 12 B. wire gauge; all the others, No. 14.
Side sheets, top and bottom tiers, No. 14 B. wire gauge; the others, No. 16.
Rivets ¼ in. diam., 1 in. apart, centres.
Rivets for joining sheets to angle iron, ⅜ in. diam., 1½ in. apart, centres.
Rivets for bottom curb, ½ in. diam., 9 in. apart, centres.
10 main and 10 secondary rafters, of T-iron, 3 × 3 × ⅜ in.

Top curb, of angle iron, 3 × 3 × ⅜ in.
Bottom curb, 2 rings of angle iron, 3 × 3 × ⅜ in., 6 in. apart, with flat bar of iron, 6 in. wide and ½ in. thick, between them.
Centre strutt, cast-iron pipe, 9 ft. long, 6 in. external diam., ¾ in. thick; bearing flanges, 13 in. diam., 1¼ in. thick; outer rim of cup strengthened by a ring of S C and crown iron, 2 × 1 in., shrunk on hot.
10 vertical ribs, T-iron, 3 × 3 × ⅜ in., secured to top and bottom curbs and to side sheets.
5 columns, 18 ft. long; diam. at base, 7 in.; diam. at top, 5 in.; metal ¾ in. thick.
Suspension chains, ½ in. short link, tested to 5 tons.

Single Gasholder.

Diameter, 50 ft. Depth, 18 ft.
Roof sheets, No. 14 B. wire gauge.
Side sheets, No. 15 B. wire gauge.
Inlet and outlet pipes, 9 in. diam.

Single Gasholder.

Diameter, 60 ft. Depth, 17 ft.
Rise of crown, 3 ft.
Crown plate, 4 ft. diam., ½ in. thick.
Roof sheets, inner and outer circles, No. 13 B. wire gauge; the rest, No. 14.
Side sheets, top and bottom tiers, No. 14 B. wire gauge; the rest, No. 15.
Top curb, 4 × 4 × 7-16ths in. angle iron.
Bottom curb, two bars of 3 × 3 × ⅝ in. angle iron, placed back to back, and bar of flat iron riveted to the bottom with ⅝ in. rivets.
16 vertical bars, 2½ × 2½ × ⅜ in. T-iron, riveted to top and bottom curbs and to side sheets.
8 columns, 18 ft. long; diam. at base, 6⅜ in.; at top, 5½ in.; metal ¾ in. thick.

Single Gasholder.

Diameter, 60 ft. Depth, 18 ft.
Roof sheets, inner and outer circles, No. 13 B. wire gauge; the others, No. 14.
Side sheets, top and bottom tiers, No. 14 B. wire gauge; the others, No. 15.
Top curb, 4 × 4 × ½ in. angle iron.
Bottom curb, formed of two bars of angle iron, 4 × 4 × ½ in., riveted back to back with ⅝ in. rivets 12 in. apart, centres.
14 vertical bars, 4 × 3 × ½ in. T-iron.
7 columns, 19 ft. 6 in. long each.

Single Gasholder.

Diameter, 81 ft. 8 in. Depth, 70 ft. 6 in.
Rise of crown, 3 ft.
Crown plate, 4 ft. diam., ½ in. thick.
Roof sheets, inner and outer circles, No. 10; all the rest, No. 14 B wire gauge.
Side sheets, top and bottom tiers, No. 14; all the rest, No. 16 B. wire gauge.
Rivets, ¼ in. diam., 1 in. apart, centres.
16 main rafters, 5 × 3 × ½ in. T-iron.
16 secondary rafters, 4 × ½ in. flat iron, placed on edge.
Centre strutt, cast-iron pipe, 9 ft. long, 7 in. external diam., 1 in. thick; flanges, 13 in. diam., 1¼ in. thick; cup strengthened by a hoop 2 × 1 in. S C iron, shrunk on hot.
Tension rods, long Queen bolts, short Queen bolts, long suspenders, short suspenders, 16 in number each, of 1¼ in., 1½ in., 1¼ in., 1 in., and ⅞ in. round iron respectively.

Top curb, of angle iron, double, 4 × 4 × ½ in.
Bottom curb, of angle iron, 4 × 4 × ½ in., with bar of flat iron 6 × ½ in. between, and riveted with ⅝ in. rivets 12 in. apart.
12 vertical bars, 4 × 3 × ½ in. T-iron.

Single Gasholder.

Diameter, 87 ft. Depth, 20 ft.

Rise of crown, 4 ft.
2 crown plates, 4 ft. diam., ½ in. thick.
Roof sheets, inner and outer circles, No. 12; the rest, No. 14 B. wire gauge, except 9 sheets upon which the sliding carriages are fixed, No. 7 B. wire gauge.
Side sheets, top and bottom tiers, No. 12; all the remainder, No. 14 B. wire gauge.
Centre-pipe of wrought iron, 12 ft. long, 12 in. diam.
Truss cup, wrought iron, 3 ft. diam., ¾ in. thick.
18 main bars, T-iron, 4 × 3 × ½ in.
18 secondary bars, T-iron, 3 × 3 × ½ in.
9 rings or purlins of bracket bars, the middle purlin of angle iron 3½ × 3½ × ½ in., the remainder of flat iron 2 × ½ in., secured to main and secondary bars with ⅝ in. bolts.
18 principal tension rods, 1¼ in. diam.
36 diagonal tension rods, ⅞ in. diam.
36 truss bars; 18 of 1½ in. diam., 18 of 1¼ in. diam.
Top curb, 2 rings of angle iron, 3½ × 3½ × ⅜ in.
Bottom curb, 2 rings of angle iron, 3½ × 3½ × ⅜ in.
18 vertical truss bars, T-iron, 3½ × 3½ × ½ in.
9 columns, 22 ft. long each, 14 in. diam. at base, 11 in. at top.
4 holding-down bolts, 8 ft. long, 1½ in. diam.

Single Gasholder.

Diameter, 142 ft. Depth, 55 ft.

Roof without trussing or framework.
Roof sheets—First or outside circle, 3 ft. long, ⅜ in. thick; rivets ⅝ in. diam., 2½ in. apart, centres. Second circle, 3 ft. long, ¼ in. thick; rivets 9-16ths diam., 2½ in. apart, centres; centre sheets, forming a circle 30 ft. diam., ¼ in. thick, butted and riveted to each other by lapping pieces 3½ in. wide; rivets 9-16ths in. diam.; remainder of roof sheets 5 ft. long, 3-16ths in. (No. 7 B. wire gauge) thick; rivets ⅜ in. diam., 1¼ in. apart, centres.
Side sheets, top and bottom tiers, ¼ in. thick; rivets ½ in. diam., 1⅜ in. apart, centres. Intervening side sheets, No. 10 B. wire gauge; rivets ⅜ in. diam., 1¼ in. apart, centres.
Top curb, a circular chamber or girder, in section nearly rectangular, outer depth, 18 in.; inner depth, 19¼ in.; width, 2 ft. 6 in.; constructed of 4 × 4 × ½ in. angle iron.
Bottom curb, formed of two circles of ⅜ in. boiler-plates, 12 in. wide, each riveted to a circle of angle iron, 4 × 4 × ½ in.
32 vertical stays, 3 sides of a rectangular figure, 12 in. wide, 10 in. deep; formed of 4 angle irons 3 × 3 × ⅜ in., and ¼ in. boiler-plate.
16 columns, diam. at base, 3 ft.; at top, 2 ft. 3 in.; metal ⅞ in. to ¾ in. thick.
4 holding-down bolts, 10 ft. long, 2¼ in. round iron.

Single Gasholder.

Diameter, 100 ft. Depth, 20 ft.

Rise of crown, 5 ft.
2 crown plates, 5 ft. diam., ⅜ in. thick.

Roof sheets, inner and outer circles, No. 10; the remainder, No. 12 B. wire gauge, except carriage sheets, ¼ in. thick.

Side sheets, top and bottom tiers, No. 9; the remainder, No. 12 B. wire gauge.

Rivets, 5-16th in. diam., 1 in apart, centres.

Centre-pipe of wrought iron, 14 ft. long, 24 in. diam., 5-16ths in. thick.

18 main and 18 secondary bars.

Top curb, 2 rings of angle iron, 4 × 4 × 7-16ths in.

Bottom curb, 2 rings of angle iron, 4 × 4 × 7-16ths in., and a flat bar of wrought iron 6 × ⅜ in.

18 vertical bars, T-iron, 4 × 4 × ⅜ in.

9 columns, 24 ft. long, 24 in. diam. at base, 18 in. diam. at top, 1¼ to 1 in. metal.

4 holding-down bolts, 8 ft. long, 1½ in. diam.

Telescopic Gasholder.

Diameter of outer lift, 44½ ft. Depth, 16 ft.

Diameter of inner lift, 43 ft. Depth, 16 ft.

Rise of crown, 1 ft. 9 in.

Crown plate, 3 ft. 6 in. diam., ⅜ in. thick.

Roof sheets, inner and outer circles, No. 12; all the rest, No. 14 B. wire gauge.

Side sheets in both lifts, top and bottom tiers, No. 12; all the rest, No. 16 B. wire gauge.

Rivets for Nos. 12 and 14 sheets 5-16ths in. diam.; for No. 16 sheets, ¼ in. diam.

Cup, inner lift, formed by 2 rings of 2½ × 2½ × 5-16ths in. angle iron, connected together with No. 8 plates, with side of No. 10 plate, and a ring 1¼ × ½ in. ½ round iron, riveted round.

Dip, outer lift, the counterpart of the cup, inverted.

Main bearing bars, T-iron, 3 × 3 × ½ in.

Secondary bearing bars, T-iron, 3 × 3 × ⅜ in.

6 vertical bars, inner lift, T-iron, 2½ × 2½ × ⅜ in.

6 vertical bars, outer lift, T-iron, 2½ × 1½ × ⅜ in.

Bottom curb, angle iron, double, 3 × 3 × ⅜ in.

6 columns, 12 in. diam. at base, 10 in. at top; metal 1 in. to ¾ in. thick.

Telescopic Gasholder.

Diameter, outer lift, 87 ft. Depth, 20 ft.

Diameter, inner lift, 85 ft. Depth, 20½ ft.

Rise of crown, 4 ft.

2 crown plates, 4 ft. diam., ½ in. thick.

Roof sheets, inner and outer circles, No. 12; the, rest No. 14 B. wire gauge, except 9 sheets upon which the carriages are fixed, No. 7 B. wire gauge.

Side sheets, top and bottom tiers, both lifts, No. 12; all the rest, No. 14 B. wire gauge.

Hydraulic cup and dip, 7 in. wide, 16 in. deep.

Centre-pipe of wrought iron, 12 ft. long, 12 in. diam.

Truss cup, wrought iron, 3 ft. diam., ¾ in. thick.

18 main bars, T-iron, 4 × 3 × ½ in.

18 secondary bars, T-iron, 3 × 3 × ½ in.

9 rings or purlins of bracket bars, the middle purlin of angle iron, 3½ × 3½ × ½ in., the remainder of flat iron 2 × ½ in., secured to main and secondary bars with ⅝ in. bolts.

18 principal tension rods, 1¼ in. diam.

36 diagonal tension rods, ⅞ in. diam.

36 truss bars; 18 of 1½ in. diam., 18 of 1¼ in diam.

Bottom curb, 2 rings of angle iron, 3½ × 3½ × ⅜ in.

18 vertical truss bars, T-iron, 3½ × 3½ × ½ in.

9 columns, 41 ft. long, 30 in. diam. at base, 20 in. at top, 1⅜ to ⅞ in. metal, cast in 4 lengths.

4 holding-down bolts, 8 ft. long, 1½ in. diam.

Telescopic Gasholder.

Diameter, outer lift, 100 ft. Depth, 22 ft.
Diameter, inner lift, 98 ft. Depth, 22 ft.

Roof sheets, No. 11 B. wire gauge.
Side sheets, top tier, No. 11; all the others, No. 12 B. wire gauge.
Rivets, ¼ in. diam., 1 in. apart, centres.
Hydraulic joint, 8 in. wide, 15 in. deep, No. 10 B. wire gauge; top edge of cup and bottom edge of dip bound by half round iron, 2 × 1 in. thick.
Bottom curb, angle iron, 4 × 1 in. at the root, and ring of bar iron 4 × 1 in.
12 columns, 24 in. diam. at base, 16 in. at top; metal 1⅛ to 1 in. thick.
4 holding-down bolts, 10 ft. long, 2 in. square iron.

Telescopic Gasholder.

Diameter, outer lift, 102 ft. Depth, 22 ft.
Diameter, inner lift, 100 ft. Depth, 22½ ft.

Rise of crown, 4 ft.
Crown plate, 5 ft. diam., ⅝ in. thick.
Roof sheets, first ring next centre, No. 9; next and outer rings, No. 11; all the rest, No. 12 B. wire gauge.
Side sheets, outer lift, top and bottom tiers, No 11; all the rest, No. 13 B. wire gauge. Inner lift, top and bottom tiers, No. 13; all the rest, No. 17 B. wire gauge.
Cup and dip, 8 in. wide, 15 in. deep, of angle iron 3 × 3 × ⅜ in.; plate, No. 7 B. wire gauge; edges stiffened with 1½ × ¾ in. half round iron; ¼ in. rivets, 6 in. apart.
10 columns, 18 in. diam. at base, 14 in. at top; metal 1¼ to ¾ in. thick, cast in 4 lengths.
4 holding-down bolts, 8 ft. long, 2 in. square, wrought iron.

Telescopic Gasholder.

Diameter, outer lift, 103 ft. Depth, 25½ ft.
Diameter, inner lift, 101 ft. Depth 24 ft.

2 crown plates, 4 ft. diam., ½ in. thick.
Roof sheets, inner and outer rings, ⅛ in. thick; all the rest, 1-10th in. thick.
Side sheets, top and bottom tiers, ⅛ in. thick; the remainder, 1-10th in. thick.

THICKNESS OF THE BIRMINGHAM WIRE GAUGE.

No. of Gauge.	Thickness in Inches.	No. of Gauge.	Thickness in Inches.	No. of Gauge.	Thickness in Inches.	No. of Gauge.	Thickness in Inches.
0000	·454	7	·180	17	·058	27	·016
000	·425	8	·165	18	·049	28	·014
00	·380	9	·148	19	·042	29	·013
0	·340	10	·134	20	·035	30	·012
1	·300	11	·120	21	·032	31	·010
2	·284	12	·109	22	·028	32	·009
3	·259	13	·095	23	·025	33	·008
4	·238	14	·083	24	·022	34	·007
5	·220	15	·072	25	·020	35	·005
6	·203	16	·065	26	·018	36	·004

WEIGHT IN POUNDS OF A SUPERFICIAL FOOT OF IRON, COPPER, AND BRASS.

Thickness by the Birmingham Wire Gauge.	Iron. lbs.	Copper. lbs.	Brass. lbs.	Thickness by the Birmingham Wire Gauge.	Iron. lbs.	Copper. lbs.	Brass. lbs.
1	12·50	14·50	13·75	16	2·50	2·90	2·75
2	12·00	13·90	13·20	17	2·18	2·52	2·40
3	11·00	12·75	12·10	18	1·86	2·15	2·04
4	10·00	11·60	11·00	19	1·70	1·97	1·87
5	8·74	10·10	9·61	20	1·54	1·78	1·69
6	8·12	9·40	8·93	21	1·40	1·62	1·54
7	7·50	8·70	8·25	22	1·25	1·45	1·37
8	6·86	7·90	7·54	23	1·12	1·30	1·23
9	6·24	7·20	6·86	24	1·00	1·16	1·10
10	5·62	6·50	6·18	25	·90	1·04	·99
11	5·00	5·80	5·50	26	·80	·92	·88
12	4·38	5·08	4·81	27	·72	·83	·79
13	3·75	4·34	4·12	28	·64	·74	·70
14	3·12	3·60	3·43	29	·56	·64	·61
15	2·82	3·27	3·10	30	·50	·58	·55

WEIGHT OF A SUPERFICIAL FOOT OF VARIOUS METALS.

Thickness in Inches.	Wrought Iron.	Cast Iron.	Steel.	Copper.	Brass.	Lead.	Zinc.	Thickness in Inches.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
$\frac{1}{16}$	2·526	2·344	2·552	2·891	2·734	3·708	2·344	$\frac{1}{16}$
$\frac{1}{8}$	5·052	4·687	5·104	5·781	5·469	7·417	4·687	$\frac{1}{8}$
$\frac{3}{16}$	7·578	7·031	7·656	8·672	8·203	11·125	7·031	$\frac{3}{16}$
$\frac{1}{4}$	10·104	9·375	10·208	11·563	10·938	14·833	9·375	$\frac{1}{4}$
$\frac{5}{16}$	12·630	11·719	12·760	14·453	13·672	18·542	11·719	$\frac{5}{16}$
$\frac{3}{8}$	15·156	14·062	15·312	17·344	16·406	22·250	14·062	$\frac{3}{8}$
$\frac{7}{16}$	17·682	16·406	17·865	20·234	19·141	25·958	16·406	$\frac{7}{16}$
$\frac{1}{2}$	20·208	18·750	20·417	23·125	21·875	29·667	18·750	$\frac{1}{2}$
$\frac{9}{16}$	22·734	21·094	22·969	26·016	24·609	33·375	21·094	$\frac{9}{16}$
$\frac{5}{8}$	25·260	23·437	25·521	28·906	27·344	37·083	23·437	$\frac{5}{8}$
$\frac{11}{16}$	27·786	25·718	28·073	31·797	30·078	40·792	25·781	$\frac{11}{16}$
$\frac{3}{4}$	30·312	28·125	30·625	34·688	32·813	44·500	28·125	$\frac{3}{4}$
$\frac{13}{16}$	32·839	30·469	33·177	37·578	35·547	48·208	30·469	$\frac{13}{16}$
$\frac{7}{8}$	35·365	32·812	35·729	40·469	38·281	51·917	32·812	$\frac{7}{8}$
$\frac{15}{16}$	37·891	35·156	38·281	43·359	41·016	55·625	35·156	$\frac{15}{16}$
1	40·417	37·500	40·833	46·250	43·750	59·333	37·500	1

VALVES.

Hydraulic valves are preferable to slide valves about a Gas-works. The latter, however well made, begin to allow gas to pass after they have been at work for a time. The former seldom get out of order. Care should be taken to have a good deep water-lute.

FLAT BAR IRON.

Weight of a Lineal Foot in Pounds.

Breadth in Inches.	Thickness in Parts of an Inch.								
	¼	5/16	⅜	7/16	½	⅝	¾	⅞	1
1	·835	1·044	1·253	1·461	1·670	2·088	2·506	2·923	3·340
1⅛	·939	1·174	1·409	1·644	1·878	2·348	2·818	3·287	3·756
1¼	1·044	1·305	1·566	1·826	2·088	2·609	3·132	3·653	4·176
1⅜	1·148	1·435	1·722	2·009	2·296	2·870	3·444	4·018	4·592
1½	1·252	1·566	1·879	2·192	2·504	3·131	3·758	4·384	5·008
1⅝	1·358	1·696	2·035	2·374	2·716	3·392	4·070	4·749	5·432
1¾	1·462	1·827	2·192	2·557	2·924	3·653	4·384	5·114	5·848
1⅞	1·566	1·957	2·348	2·740	3·132	3·914	4·696	5·479	6·264
2	1·671	2·088	2·505	2·922	3·342	4·175	5·010	5·845	6·684
2⅛	1·775	2·218	2·662	3·105	3·550	4·435	5·324	6·210	7·100
2¼	1·880	2·348	2·818	3·288	3·760	4·696	5·636	6·575	7·520
2⅜	1·984	2·479	2·975	3·470	3·968	4·957	5·950	6·941	7·936
2½	2·088	2·609	3·131	3·653	4·176	5·218	6·262	7·306	8·352
2⅝	2·193	2·740	3·288	3·836	4·386	5·479	6·576	7·671	8·772
2¾	2·297	2·870	3·444	4·018	4·594	5·740	6·888	8·036	9·188
2⅞	2·402	3·001	3·601	4·201	4·804	6·001	7·202	8·402	9·608
3	2·506	3·131	3·758	4·384	5·012	6·262	7·516	8·767	10·024
3¼	2·715	3·392	4·071	4·749	5·430	6·784	8·142	9·498	10·860
3½	2·923	3·653	4·384	5·114	5·846	7·306	8·768	10·228	11·692
3¾	3·132	3·914	4·697	5·479	6·264	7·828	9·394	10·959	12·528
4	3·341	4·175	5·010	5·845	6·682	8·350	10·020	11·690	13·364
4¼	3·549	4·436	5·323	6·210	7·098	8·871	10·646	12·421	14·196
4½	3·758	4·697	5·636	6·575	7·516	9·393	11·272	13·151	15·032
4¾	3·966	4·958	5·949	6·941	7·932	9·915	11·898	13·881	15·864
5	4·175	5·219	6·263	7·306	8·350	10·437	12·526	14·612	16·700
5¼	4·384	5·479	6·576	7·671	8·768	10·958	13·152	15·343	17·536
5½	4·593	5·741	6·889	8·037	9·186	11·480	13·778	16·073	18·372
5¾	4·801	6·001	7·202	8·402	9·602	12·002	14·404	16·804	19·204
6	5·010	6·262	7·515	8·767	10·020	12·524	15·030	17·535	20·042

STEEL.

Weight of One Foot of Round Steel.

Diameter in Inches and Parts.	¼	⅜	½	⅝	¾	⅞	1	1⅛	1¼	1⅜	1½	1⅝	1¾	1⅞	2
Weight in lbs. and Decimal Parts	·167	·376	·669	1·04	1·5	2·05	2·67	3·38	4·18	5·06	6·02	7·07	8·2	9·41	11·71

To find the weight of an iron casting from its deal pattern, multiply the weight of the pattern by 17.

Cast iron in cooling shrinks one-eighth of an inch per foot.

MAIN-LAYING.

In beginning to lay an extensive length of main-pipes, considerable delay, and consequent loss, is often experienced at first, owing to a want of foresight in providing beforehand the necessary men, tools, and other appliances required. The following is an enumeration of what it is necessary should be provided, varying according to the peculiarities of the district and the extent of the work to be done :—

One or two skilled main-layers.
A number of labourers, according to the extent of the work.
A pavior and his labourer.
A night watchman.
A pick and spade (and a tool, if clay) for each labourer.
A supply of picks, pick-handles, and wedges should be kept in stock, to replace broken ones.
A screen for separating stones and soil.
A box for the night watchman.
A pair of shear-legs, or, what is better,
A moveable pipe-layer, supported on wheels, running on rails laid alongside of the trench.
Blocks, tackle, and ropes.
A chain or clip to encircle the pipes.
Eight hand-spikes of wood, for moving the pipes about.
Two pieces of 2 or 3 inch wrought-iron tube (according to the size of main), on which to roll the pipe previous to lowering it to its place in the trench.
Two or four long iron bars, and two short ones.
Two planks for long and strong leverage.
Red lead, mixed up with boiled oil, if turned and bored joints.
Some cotton waste and old cards to clean the joints, if turned and bored.
A supply of lead and spun-yarn, if open joints.
Two or four oak blocks, strengthened with bolts or hoops, to lay against the pipe-sockets when driving.
A 3 or 4 inch cast-iron pipe, to swing with a rope or chain from centre of shear-legs when driving.
Wooden plugs for the various sizes of pipes and branches.
A lead pot and two ladles.
Chisels and caulking tools.
Some tarred rope, for trying the joints and pipes.
A coke fire-grate, for melting the lead and for use by the night watchman.
Three setts, with handles, for cutting any pipes required.
Two large hammers and three smaller ones.
Some fine flax for indifferent joints.
A few casks of Roman cement.
A bogie, or hand-drug, and two or three hand-barrows.
A supply of good soil for bedding the pipes, and to prevent the contact of ashes, if such should be present in the cutting.
A spirit-level, and a straight-edge 10 or 12 feet long.
A supply of planking to cover up any part of the trench temporarily.
Look up beforehand what bends, tees, thimbles, flanges, syphon-wells, and other odd castings will be required in the course of the work, and have them in readiness when needed.
Two stand-pipes, for signal-lights at night.

In enlarging or replacing pipes, many services require to be coupled up and renewed, and in that case service-layers and tools should be got in readiness.

BURRS ON TURNED AND BORED JOINTS.

In driving cast-iron pipes having turned and bored joints, they will sometimes be found to spring back at every stroke. This is almost invariably caused by the presence of a burr, or roughness, on the inner edge of the bored part of the socket, or turned portion of the spigot. Chip the burr off with a sharp chisel.

On level ground, mains should be laid with a fall of about 12 inches in 200 yards, and where the incline alters a syphon-well should be attached.

Pipes of 6 inches diameter and upwards should be cast vertically in dry sand moulds.

In laying down mains in lieu of others of a smaller size, the difference of value between the two sizes of pipes only should be charged to Capital account.

WORN-OUT SERVICE-PIPES.

It is not possible always to see whether a wrought-iron service-pipe is worn out or not, unless it is taken up out of the ground. The under part of the pipe will often be found completely oxidized, when the upper surface is sound and good. The rust forms a shell, which crumbles on being disturbed, but when untouched is sufficient to prevent the escape of gas.

WEIGHT OF CAST-IRON PIPES.

Diameter.	For Gas.			For Water.			Length.
Inches.	c.	q.	lb.	c.	q.	lb.	Feet.
1	0	1	3	0	1	9	6
1½	0	1	7	0	1	14	6
2	0	1	16	0	2	0	6
2½	0	2	0	0	2	14	6
3	0	3	18	1	0	0	9
4	1	1	13	1	2	0	9
5	1	3	8	2	0	0	9
6	2	0	16	2	2	0	9
7	3	0	0	3	1	0	9
8	3	0	24	3	2	14	9
9	4	0	0	4	1	0	9
10	4	2	6	5	0	0	9
11	5	0	1	5	2	0	9
12	5	2	20	6	0	0	9
14	6	1	8	7	0	0	9
15	8	1	0	8	2	0	9
16	9	1	0	9	2	0	9
18	11	1	0	11	2	0	9
20	13	2	0	14	0	0	9
21	14	0	0	14	2	0	9
24	17	2	0	18	0	0	9
30	26	1	0	27	2	0	9
36	34	3	0	37	1	0	9
42	46	2	0	49	2	0	9
48	51	0	0	54	2	0	9

TABLE *showing the Discharges of Gas in Cubic Feet per Hour. Specific Gravity,* ·420; *pressure,* 1 *Inch.* (*Clegg, 4th Ed., p.* 304.)

Length of Pipes in Yards.	Diameter of Pipes in Inches.															
	2.	3.	4.	5.	6.	7.	8.	9.	10.	12.	14.	16.	18.	20.	22.	24.
20	2,291	7,253	..	..	..	..	..	..	..	..	..	..	..	..	..	—
30	2,149	5,941	12,160	21,262	..	..	..	..	..	..	..	..	..	..	..	—
40	1,859	5,127	11,340	18,192	28,965	..	..	..	..	..	..	..	..	..	..	—
50	1,666	4,580	9,417	16,367	25,758	38,168	53,308	..	..	..	..	..	..	..	..	—
100	1,177	3,244	6,652	11,643	18,322	26,989	37,670	50,519	65,475	..	..	..	..	..	..	—
150	961	2,653	5,421	9,483	14,968	21,027	30,758	41,334	53,970	84,758	124,362	..	..	..	..	—
200	833	2,284	4,708	8,209	12,976	19,051	26,611	35,757	46,575	73,288	107,950	150,681	201,986	..	..	—
250	745	2,053	4,212	7,357	11,566	17,066	23,846	32,367	42,580	65,703	96,579	134,774	179,252	235,440	300,564	—
300	679	1,871	3,844	6,716	10,594	15,479	21,686	29,196	37,935	59,875	88,111	123,033	164,899	214,920	272,467	392,418
400	589	1,615	3,326	5,804	9,136	13,594	18,576	25,259	32,845	51,904	76,204	106,464	139,530	186,840	235,877	344,050
500	529	1,433	2,980	5,129	8,164	12,039	16,848	22,526	29,430	46,461	68,266	95,785	127,714	164,700	211,048	308,458
600	480	1,324	2,721	4,725	7,481	10,970	15,292	20,557	26,865	43,379	62,181	87,145	116,785	151,740	192,753	281,080
700	442	1,227	2,505	4,307	6,901	10,187	14,169	19,026	24,840	39,288	57,682	80,924	108,037	140,400	177,071	260,091
800	..	1,142	2,354	4,083	6,463	9,526	13,305	17,824	23,220	36,547	53,978	75,740	101,039	131,220	166,617	243,664
900	..	1,081	2,203	3,847	6,075	8,996	12,268	16,839	21,870	34,599	50,803	71,248	95,653	124,200	158,122	228,062
1,000	..	1,020	2,095	3,678	5,783	8,533	11,836	15,965	20,790	32,853	48,157	67,382	90,541	117,720	148,975	218,111
1,760	..	..	1,576	2,767	4,374	6,416	8,985	12,137	17,010	24,688	36,250	50,803	68,234	88,560	112,384	164,268
2,640	..	..	1,296	2,261	3,547	5,225	7,257	9,841	12,690	20,217	29,635	41,512	55,549	72,360	91,476	134,152
3,520	..	..	1,123	1,957	3,013	4,498	6,307	8,529	11,070	17,526	25,686	35,942	48,114	62,640	79,061	115,900
5,280	..	..	..	..	2,527	3,704	5,184	6,889	9,040	14,191	20,905	28,030	39,366	50,760	64,680	94,910
7,040	..	..	..	..	..	3,175	4,496	6,014	7,836	12,247	17,992	25,228	34,117	44,280	55,892	82,134
8,800	..	..	..	..	..	..	..	5,358	7,020	10,886	16,140	22,464	29,305	39,420	50,311	73,008
10,000	..	..	..	..	..	..	..	..	..	10,303	15,081	21,082	28,431	36,720	47,044	68,445

TABLES.

Discharges of Gas in Cubic Feet per Hour through Pipes of various Diameters and Lengths at different Pressures. The Specific Gravity of the Gas estimated at ·400, *Air being* 1·000. (*Mr. T. G. Barlow, C.E., Journal of Gas Lighting, Vol.* ii., *p.* 473, *and Vol.* iii., *pp.* 27, 54, *and* 175.)

Diameter of Pipe ·5 *Inch.*

Length in yards	10	20	30	50	75	100	150
Quantity delivered with 0·1 in. pressure	37·7	26·7	21·7	16·8	13·8	11·9	9·7
0·2 ,,	53·4	37·7	30·6	23·8	19·5	16·8	13·8
0·3 ,,	65·2	46·3	37·7	29·1	23·8	20·7	16·8
0·4 ,,				33·7	27·5	23·8	19·5
0·5 ,,						26·7	21·7

Diameter of Pipe ·75 *Inch.*

Length in yards	10	20	30	50	75	100	150
Quantity delivered with 0·1 in. pressure	104·3	73·8	60·0	46·6	37·9	32·9	26·9
0·2 ,,	147·5	104·3	84·9	65·8	53·7	46·6	37·9
0·3 ,,			104·3	80·9	65·8	57·0	46·6
0·4 ,,				93·2	75·9	65·8	53·8
0·5 ,,						73·8	60·0

Diameter of Pipe 1 *Inch.*

Length in yards	10	20	30	50	75	100	150
Quantity delivered with 0·1 in. pressure	214	151	124	95	78	67	55
0·2 ,,	302	214	175	135	110	95	78
0·3 ,,			214	165	135	117	95
0·4 ,,				190	156	135	110
0·5 ,,						151	123

Diameter of Pipe 1·25 *Inch.*

Length in yards	25	50	75	100	150	200	300
Quantity delivered with 0·1 in. pressure	236	167	137	118	96	84	68
0·2 ,,	333	236	192	167	137	118	96
0·3 ,,		289	236	205	167	144	118
0·4 ,,				236	192	167	137
0·5 ,,						187	152

Diameter of Pipe 1·5 *Inch.*

Length in yards	25	50	75	100	150	200	300
Quantity delivered with 0·1 in. pressure	374	264	215	187	152	132	107
0·2 ,,	528	374	304	264	215	187	152
0·3 ,,		458	374	322	264	229	187
0·4 ,,				374	304	264	215
0·5 ,,						295	239

Diameter of Pipe 2 Inches.

Length in yards	50	75	100	150	200	300	500
Quantity delivered with 0·1 in. pressure	540	441	381	311	270	220	170
0·2 ,,	763	623	540	441	381	311	241
0·3 ,,		763	665	540	468	381	296
0·4 ,,				623	540	441	341
0·5 ,,						492	381

Diameter of Pipe 2·5 Inches.

Length in yards	50	75	100	150	200	300	500
Quantity delivered with 0·1 in. pressure	943	770	667	545	471	335	298
0·2 ,,	1335	1090	943	770	667	545	421
0·3 ,,		1335	1172	943	819	667	516
0·4 ,,				1090	943	770	596
0·5 ,,						861	667
0·6 ,,							731

Diameter of Pipe 3 Inches.

Length in yards	100	150	250	500	750	1000	1250
Quantity delivered with 0·1 in. pressure	1054	859	666	471	384	333	298
0·2 ,,	1440	1214	942	666	543	471	375
0·3 ,,		1487	1153	815	666	576	529
0·4 ,,			1332	942	768	666	596
0·5 ,,				1054	859	744	666
0·6 ,,					942	815	739
0·8 ,,						942	845
1·0 ,,							942

Diameter of Pipe 4 Inches.

Length in yards	100	250	500	750	1000	1250	1500
Quantity delivered with 0·1 in. pressure	2160	1366	966	788	683	611	557
0·2 ,,	3054	1932	1366	1114	966	864	788
0·3 ,,		2366	1673	1366	1183	1058	966
0·4 ,,			1932	1576	1366	1222	1114
0·5 ,,				1761	1526	1366	1245
0·6 ,,				1932	1672	1496	1366
0·8 ,,					1932	1728	1576
1·0 ,,						1932	1761
1·5 ,,							2160

Diameter of Pipe 5 Inches.

Length in yards	100	250	500	750	1000	1250	1500
Quantity delivered with 0·1 in. pressure	3540	2245	1587	1296	1122	1000	910
0·2 ,,	5005	3174	2245	1832	1587	1414	1296
0·3 ,,		3888	2748	2245	1943	1732	1575
0·4 ,,			3174	2592	2245	2000	1820
0·5 ,,				2888	2508	2236	1934
0·6 ,,				3174	2748	2449	2245
0·8 ,,					3174	2828	2596
1·0 ,,						3174	2877
1·5 ,,							3540

Diameter of Pipe 6 Inches.

Length in yards	250	500	750	1000	1250	1500	1750
Quantity delivered with 0·1 in. pressure	3770	2660	2170	1880	1680	1530	1420
0·2 ,,	5320	3770	3130	2660	2370	2170	2010
0·3 ,,	6520	4620	3770	3270	2920	2660	2460
0·4 ,,	7540	5320	4340	3770	3360	3060	2840
0·5 ,,		5970	4860	4210	3770	3430	3180
0·6 ,,			5320	4620	4130	3770	3460
0·8 ,,				5320	4740	4340	4020
1·0 ,,					5320	4860	4500
1·5 ,,						5970	5500
2·0 ,,							6360

Diameter of Pipe 7 Inches.

Length in yards	250	500	750	1000	1250	1500	1750
Quantity delivered with 0·1 in. pressure	5560	3920	3200	2780	2470	2270	2100
0·2 ,,	7840	5560	4510	3920	3500	3200	2960
0·3 ,,	9600	6800	5560	4800	4300	3920	3640
0·4 ,,	11,120	7840	6400	5560	4940	4540	4200
0·5 ,,		8750	7180	6200	5560	5060	4680
0·6 ,,			7840	6800	6080	5560	5130
0·8 ,,				7840	7020	6400	5930
1·0 ,,					7840	7180	6610
1·5 ,,						8750	8120
2·0 ,,							9360

Diameter of Pipes 8 Inches.

Length in yards	250	500	750	1000	1250	1500	1750
Quantity delivered with 0·1 in. pressure	7,760	5,470	4,470	3,880	3,460	3,160	2,920
0·2 ,,	10,940	7,760	6,310	5,470	4,880	4,470	4,130
0·3 ,,	13,400	9.450	7.760	6,700	5,980	5,470	5,050
0·4 ,,	15,520	10,940	8,940	7,760	6,920	6,320	5,840
0·5 ,,		12,200	9,900	8,640	7,760	7,020	6,520
0·6 ,,			10,940	9,450	8,480	7,760	7,150
0·8 ,,				10,940	9,780	8,940	8,260
1·0 ,,					10,940	9,900	9,237
1·5 ,,						12,200	11.300
2·0 ,,							13,040

Diameter of Pipe 9 Inches.

Length in yards	250	500	750	1000	1250	1500	1750
Quantity delivered with 0·1 in. pressure	10,400	7,380	6,350	5,200	4,650	4 250	3,950
0·2 ,,	14,760	10,400	8,500	7,380	6,480	6,000	5,620
0·3 ,,	18,000	12,780	10,400	9,000	8,300	7,380	6,800
0·4 ,,	20,800	14.760	12,700	10,400	9,300	8,500	7,900
0·5 ,,		16,500	13,420	11,900	10,400	9,680	8,800
0·6 ,,			14,760	12,780	11,400	10,400	9,650
0·8 ,,				14,760	13,100	12,000	11,050
1·0 ,,					14,760	13,420	12,380
1·5 ,,						16,500	15,200
2·0 ,,							17,600

Diameter of Pipe 10 *Inches.*

Length in yards	500	750	1000	1250	1500	1750	2000
Quantity delivered with 0·1 in. pressure	9,560	7,800	6,750	6,050	5,520	5,100	4,780
0·2 ,,	13,500	11,040	9,560	8,520	7,800	7,300	6,750
0·3 ,,	16,500	13,500	11,700	10,520	9,560	8,850	8,250
0·4 ,,	19,120	15,600	13,500	12,100	11,040	10,200	9,560
0·5 ,,	21,300	17,400	15,050	13,500	12,380	11,400	10,650
0·6 ,,		19,120	16,500	14,800	13,500	12,500	11,650
0·8 ,,			19,120	17 050	15,600	14,400	13,500
1·0 ,,				19,120	17,400	16,150	15,050
1·5 ,,					21,300	19,600	18,500
2·0 ,,						22,800	21,300

Diameter of Pipe 12 *Inches.*

Length in yards	500	750	1000	1250	1500	1750	2000
Quantity delivered with 0·1 in. pressure	15,100	12,300	10,700	9,550	8,700	8,050	7,550
0·2 ,,	21,400	17,400	15,100	13,450	12,300	11,350	10,700
0·3 ,,	26,100	21,400	19,500	16,500	15,100	13,880	13,050
0·4 ,,	30,200	24,600	21,400	19,100	17,400	16,100	15,100
0·5 ,,	33,600	27,500	23,800	21,400	19,440	18,050	16,800
0·6 ,,		30,200	26,100	23,300	21,400	19,800	19,500
0·8 ,,			30,200	26,900	24,600	22,700	21,400
1·0 ,,				30,200	27,500	25,450	23,800
1·5 ,,					33,600	31,250	29,250
2·0 ,,						36,100	33,600

Diameter of Pipe 14 *Inches.*

Length in yards	500	750	1000	1250	1500	1750	2000
Quantity delivered with 0·1 in. pressure	22,100	18,100	15,600	13,950	12,750	11,800	11,050
0·2 ,,	31,200	25,500	22,100	19,800	18,100	16,700	15,600
0·3 ,,	38,400	31,200	27,100	24,250	22,100	20,500	19,200
0·4 ,,	44,200	36,200	31,200	27,900	25,500	23,600	22,100
0 5 ,,	49,400	40,400	35,000	31,200	28,500	26,460	24,700
0·6 ,,		44,200	38,400	34,300	31,200	28,900	27,100
0·8 ,,			44,200	39,600	36,200	33,400	31,200
1·0 ,,				44,200	40,400	37,300	35,000
1·5 ,,					49,400	45,700	42,600
2·0 ,,						52,920	49,400

Diameter of Pipe 15 *Inches.*

Length in yards	500	750	1000	1250	1500	1750	2000
Quantity delivered with 0·1 in. pressure	26,300	21,400	18,600	16,600	15,200	14,000	13,150
0·2 ,,	37,200	30,400	26,300	23,500	21,400	19,900	18,600
0·3 ,,	45,500	37,200	32,250	28,750	26,300	24,300	22,750
0·4 ,,	52,600	42,800	37,200	33,200	30,400	28,000	26,300
0·5 ,,	58,700	48,000	41,600	37,200	34,000	31,400	29,350
0·6 ,,		52,600	45,500	40,700	37,200	34,450	32,250
0·8 ,,			52,600	47,000	42,800	39,800	37,200
1·0 ,,				52,600	48,000	44,400	41,600
1·5 ,,					58,700	54,300	50,800
2·0 ,,						62,800	58,700

Diameter of Pipe 16 *Inches.*

Length in yards	500	750	1000	1250	1500	1750	2000
Quantity delivered with 0·1 in. pressure	31,000	25,250	21,850	19,550	17,850	16,550	15,500
0·2 ,,	43,700	35,700	31,000	27,700	25,250	23,400	21,850
0·3 ,,	53,600	43,700	38,100	34,000	31,000	28,700	26,800
0·4 ,,	62,000	50,500	43,700	39,100	35,700	33,100	31,000
0·5 ,,	69,120	56,600	49,000	43,700	39,900	37,150	34,560
0·6 ,,		62,000	53,600	47,900	43,700	38,100	40,700
0·8 ,,			62,000	55,400	50,500	46,800	43,700
1·0 ,,				62,000	56,600	52,400	49,000
1·5 ,,					69,120	63,900	60,100
2·0 ,,						74,300	69,120

Diameter of Pipe 18 *Inches.*

Length in yards	500	750	1000	1500	2000	2500	3000
Quantity delivered with 0·1 in. pressure	41,400	33,800	29,400	23,900	20,700	18,400	16,900
0·2 ,,	58,800	47,800	41,400	33,800	29,400	26,200	23,900
0·3 ,,	71,800	58,800	50,800	41,400	35,900	32,100	29,400
0·4 ,,	82,800	67,600	58,800	47,800	41,400	36,800	33,800
0·5 ,,	92,600	75,700	65,600	53,500	46,300	41,400	37,850
0·6 ,,		82,800	71,800	58,800	50,800	45,400	41,400
0·8 ,,			82,800	67,600	58,800	52,300	47,500
1·0 ,,				75,700	65,600	58,800	53,500
1·5 ,,					80,000	71,800	65,600
2·0 ,,						82,800	75,700
2·5 ,,							84,500

Diameter of Pipe 20 *Inches.*

Length in yards	500	750	1000	1500	2000	2500	3000
Quantity delivered with 0·1 in. pressure	54,000	44,000	38,250	31,200	27,000	24,200	22,000
0·2 ,,	76,500	62,400	54,000	44,000	38,250	34,200	31,200
0·3 ,,	93,500	76,500	66,100	54,000	46,750	41,800	38,250
0·4 ,,	105,900	88,000	76,500	62,400	54,000	48,400	44,000
0·5 ,,	120,500	98,800	85,300	69,800	62,250	54,000	49,400
0·6 ,,		108,000	93,500	76,500	66,100	59,100	54,000
0·8 ,,			108,000	88,000	76,500	68,400	62,400
1·0 ,,				98,800	85,300	76,500	69,800
1·5 ,,					102,300	93,500	85,300
2·0 ,,						108,000	98,800
2·5 ,,							110,200

Diameter of Pipe 22 *Inches.*

Length in yards	500	750	1000	1500	2000	2500	3000
Quantity delivered with 0·1 in. pressure	68,600	56,000	48,400	39,600	34,300	30,700	28,000
0·2 ,,	96,800	79,200	68,600	56,000	48,400	43,400	39,600
0·3 ,,	118,800	96,800	84,000	68,600	59,400	53,300	48,400
0·4 ,,	137,200	112,000	96,800	79,200	68,600	61,400	56,000
0·5 ,,	153,500	122,500	108,200	88,600	76,800	68,400	61,200
0·6 ,,		137,200	118,800	96,800	84,000	75,000	68,600
0·8 ,,			137,200	112,000	96,800	86,500	79,200
1·0 ,,				122,500	108,200	96,800	88,600
1·5 ,,					132,000	118,800	108,200
2·0 ,,						137,200	122,500
2·5 ,,							140,000

Diameter of Pipe 24 *Inches.*

Length in yards	500	750	1000	1500	2000	2500	3000
Quantity delivered with 0·1 in. pressure	84,000	68,600	59,500	48,500	42,000	37,500	34,300
0·2 ,,	119,000	97,000	84,000	68,600	59,500	53,400	48,500
0·3 ,,	145,500	119,000	103,000	84,000	72,700	65,200	59,500
0·4 ,,	168,000	137,200	119,000	97,000	84,000	75,000	68,600
0·5 ,,	187,500	155,000	135,600	108,600	93,800	84,000	77,500
0·6 ,,		168,000	145,000	119,000	103,000	92,000	84,000
0·8 ,,			168,000	137,200	119,000	106,000	97,000
1·0 ,,				155,000	135,600	119,000	108,600
1·5 ,,					163,000	145,500	135,600
2·0 ,,						168,000	155,000
2·5 ,,							172,000

Diameter of Pipe 26 *Inches.*

Length in yards	750	1000	1500	2000	2500	3000	4000
Quantity delivered with 0·1 in. pressure	85,000	73,500	60,000	52,000	46,500	42,500	36,750
0·2 ,,	120,000	104,000	85,000	73,500	65,800	60,000	52,000
0·3 ,,	147,000	127,000	104,000	90,000	80,600	73,500	63,500
0·4 ,,	170,000	147,000	120,000	104,000	93,000	85,000	73,500
0·5 ,,	189,000	165,000	134,000	116,000	104,000	94,500	82,500
0·6 ,,	208,000	180,000	147,000	127,000	114,000	104,000	90,000
0·8 ,,		208,000	170,000	147,000	132,000	120,000	104,000
1·0 ,,			189,000	165,000	147,000	134,000	116,000
1·5 ,,				201,000	180,000	165,000	142,000
2·0 ,,					208,000	189,000	165,000
2·5 ,,						213,000	184,000
3·0 ,,							201,000

Diameter of Pipe 28 *Inches.*

Length in yards	1000	1500	2000	2500	3000	4000	5000
Quantity delivered with 0·5 in. pressure	198,000	161,000	140,000	125,000	114,500	99,000	88,600
1·0 ,,	280,000	229,000	198,000	177,000	161,000	140,000	125,000
1·5 ,,		280,000	241,000	216,000	198,000	171,000	153,500
2·0 ,,			280,000	250,000	229.000	198,000	177,200
2·5 ,,				280,000	255,000	222,000	198,000
3·0 ,,					280,000	241,000	216,000

Diameter of Pipe 30 *Inches.*

Length in yards	1000	2000	3000	4000	5000	7500	10,000
Quantity delivered with 0·5 in. pressure	234,000	166,000	135,000	117,000	105,000	86,000	74,500
1·0 ,,	332,000	234,000	192,000	166,000	149,000	121,500	105,000
1·5 ,,		287,000	234,000	203,000	182,000	149,000	128,500
2·0 ,,			270,000	234,000	210,000	172,000	149,000
2·5 ,,				263,000	234,000	192,000	166,000
3·0 ,,					257,000	210,000	182,000
4·0 ,,						243,000	210,000

Diameter of Pipe 36 *Inches.*

Length in yards	1000	2000	3000	4000	5000	7500	10,000
Quantity delivered with 1·0 in. pressure	530,000	372,000	303,000	265,000	234,000	192,000	166,000
1·5 ,,		456,000	372,000	322,000	288,000	234,000	204,000
2·0 ,,			428,000	372,000	332,000	271,000	234,000
2·5 ,,				416,000	372,000	303,000	265,000
3·0 ,,					407,000	332,000	288,000
4·0 ,,						384,000	332,000

The above tables are calculated upon the basis of the specific gravity of the gas being ·400. The quantity of gas of any other specific gravity discharged may be ascertained by multiplying the quantity indicated in the table by ·6325 (the square root of ·400), and dividing by the square root of the specific gravity of the other gas. To facilitate these calculations, a table is annexed of the square roots of specific gravities from ·350 to ·700, rising ·005 at a time.

Example.—If a 12-inch pipe, 1000 yards long, discharges 23,800 feet of gas per hour, specific gravity ·400, at ·5 pressure, how much gas will the same pipe discharge, at the same pressure, when the specific gravity is ·560?

$$\frac{23{,}800 \times \cdot 6325}{\cdot 7483} = 20{,}116.\text{—\textit{Answer.}}$$

The tables may also be extended to longer and shorter lengths, and to higher pressures, by the application of the following axioms:—

1. The discharge of gas will be doubled when the length of the pipe is only one-fourth of any of the lengths given in the table.

2. The discharge of gas will be only one-half when the length of the pipe is four times greater than the lengths given in the table.

3. The discharge of gas is doubled by the application of four times the pressure.

TABLE.

Square Root of the Specific Gravity of Gas from ·350 *to* ·700.

Grav.	Sq. Root.	Gravity.	Sq. Root.	Gravity.	Sq. Root.	Gravity.	Sq. Root.	Gravity.	Sq. Root.
·350	·5916	·425	·6519	·495	·7035	·565	·7517	·635	·7969
·355	·5958	·430	·6557	·500	·7071	·570	·7549	·640	·8000
·360	·6000	·435	·6595	·505	·7106	·575	·7583	·645	·8031
·365	·6041	·440	·6633	·510	·7141	·580	·7616	·650	·8062
·370	·6083	·445	·6671	·515	·7176	·585	·7648	·655	·8093
·375	·6124	·450	·6708	·520	·7212	·590	·7681	·660	·8124
·380	·6164	·455	·6745	·525	·7246	·595	·7713	·665	·8155
·385	·6205	·460	·6782	·530	·7280	·600	·7746	·670	·8185
·390	·6245	·465	·6819	·535	·7314	·605	·7778	·675	·8216
·395	·6285	·470	·6856	·540	·7348	·610	·7810	·680	·8246
·400	·6325	·475	·6892	·545	·7382	·615	·7842	·685	·8276
·405	·6364	·480	·6928	·550	·7416	·620	·7874	·690	·8306
·410	·6403	·485	·6964	·555	·7449	·625	·7905	·695	·8337
·415	·6442	·490	·7000	·560	·7483	·630	·7937	·700	·8367
·420	·6481								

TABLE.

Square Root of Pressures, rising by Tenths of an Inch from One-Tenth to Four Inches.

Inches and Tenths.	Square Root.	Inches and Tenths.	Square Root.	Inches and Tenths.	Square Root.	Inches and Tenths.	Square Root.
1/10th.	·3162	1·1/10th.	1·0488	2·1/10th.	1·4491	3·1/10th.	1·7606
2/10ths.	·4472	1·2/10ths.	1·0954	2·2/10ths.	1·4832	3·2/10ths.	1·7888
3 „	·5477	1·3 „	1·1401	2·3 „	1·5165	3·3 „	1·8165
4 „	·6324	1·4 „	1·1832	2·4 „	1·5491	3·4 „	1·8439
5 „	·7071	1·5 „	1·2251	2·5 „	1·5811	3·5 „	1·8708
6 „	·7745	1·6 „	1·2649	2·6 „	1·6123	3·6 „	1·8973
7 „	·8366	1·7 „	1·3038	2·7 „	1·6431	3·7 „	1·9235
8 „	·8944	1·8 „	1·3416	2·8 „	1·6733	3·8 „	1·9493
9 „	·9487	1·9 „	1·3784	2·9 „	1·7029	3·9 „	1·9748
1 inch.	1·	2 inches.	1·4142	3 inches.	1·7320	4 inches.	2·

GAS-PIPES LAID THROUGH ARABLE LAND

Do it no harm, but rather good, inasmuch as they help to drain the land. The joints should be carefully made.

RED AND WHITE LEAD.

The red sets sooner and harder than the white, and the following reason is given for preferring the white to the red for joints:—When an expansion or contraction takes place in pipes, &c., the red lead is liable to crack, and so cause a leakage; whereas the white lead is more tractable, and better adapts itself to the varying circumstances. Some managers prefer an equal mixture of the two.

ROMAN CEMENT

Kneaded with warm water sets almost instantly; with cold water not so soon.

BOLT NECKS.

Wrap all your bolt necks with flax or tow, smeared with red lead, when using such for jointing flanges, &c.

CAST-IRON PIPES,

Of 5 inches diameter and upwards, should be cast in dry sand moulds, set vertically. Smaller sizes are usually made in green sand, in inclined moulds.

TABLE

Giving the Weight per Yard and Cost of Cast-Iron Main Gas-Pipes.

Diam. in Inches.	2	2½	3	4	5	6	7	8	9
Weight p. Yd. in lbs.	22	28	34	51	68	80	112	120	149
Cost per yard at—	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
£4 15 0 per ton	0 11¼	1 2¼	1 5¼	2 2	2 10½	3 4¾	4 9	5 1	6 3¾
5 0 0 ,,	0 11¾	1 3	1 6	2 3½	3 0½	3 7	5 0	5 4¼	6 7¾
5 5 0 ,,	1 0½	1 3¾	1 7¼	2 4¾	3 2¼	3 9	5 3	5 7½	6 11¾
5 10 0 ,,	1 1	1 4½	1 8	2 6	3 4	3 11¼	5 6	5 10¾	7 3¾
5 15 0 ,,	1 1½	1 5¼	1 9	2 7½	3 6	4 1¼	5 9	6 2	7 7¾
6 0 0 ,,	1 2¼	1 6	1 10	2 8¾	3 7¾	4 3½	6 0	6 5	7 11¾
6 5 0 ,,	1 2¾	1 6¾	1 10¾	2 10¼	3 9½	4 5½	6 3	6 8¼	8 3¾
6 10 0 ,,	1 3¼	1 7½	2 0	2 11½	3 11½	4 7¾	6 6	6 11½	8 7¾
6 15 0 ,,	1 4	1 8¼	2 0½	3 1	4 1¼	4 9¾	6 9	7 2¾	8 11¾
7 0 0 ,,	1 4½	1 9	2 1½	3 2¼	4 3	5 0	7 0	7 6	9 3¾
7 10 0 ,,	1 5¾	1 10½	2 3½	3 5	4 6¾	5 4¼	7 6	8 0½	9 11¾
8 0 0 ,,	1 7	2 0	2 5¼	3 7¾	4 10¼	5 8½	8 0	8 6¾	10 7¾

Diam. in Inches.	10	11	12	14	15	16	18	20	24
Weight p. Yd. in lbs.	170	187	212	236	308	345	420	504	653
Cost per yard at—	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
£4 15 0 per ton	7 2½	7 11¼	9 0	10 0	13 0¾	14 7½	17 9¾	21 4½	27 8¼
5 0 0 ,,	7 7	8 4¼	9 5½	10 6½	13 9	15 4¾	18 9	22 6	29 2
5 5 0 ,,	7 11½	8 9¼	9 11¼	11 0¾	14 5¼	16 2	19 8¼	23 7½	30 7¼
5 10 0 ,,	8 4¼	9 2¼	10 5	11 7	15 1½	16 11¼	20 7½	24 9	32 0¾
5 15 0 ,,	8 8¾	9 7¼	10 10½	12 1½	15 9¾	17 8½	21 6¾	25 10½	33 6¼
6 0 0 ,,	9 1½	10 0¼	11 4¼	12 7¾	16 6	18 5¾	22 6	27 0	35 0
6 5 0 ,,	9 6	10 5¼	11 10	13 2	17 2¼	19 3	23 5¼	28 1½	36 5¼
6 10 0 ,,	9 10½	10 10¼	12 3¾	13 8¼	17 10½	20 0¼	24 4½	29 3	37 10¾
6 15 0 ,,	10 3	11 3¼	12 9¼	14 2¾	18 6¾	20 9½	25 3¾	30 4½	39 4¼
7 0 0 ,,	10 7½	11 8¼	13 3	14 9	19 3	21 6¾	26 3	31 6	40 9¾
7 10 0 ,,	11 4½	12 6¼	14 2¼	15 9¾	20 7½	23 1¼	28 1½	33 9	43 8¾
8 0 0 ,,	12 1¾	13 4¼	15 1¾	16 10¼	22 0	24 7¾	30 0	36 0	46 7¾

TABLE

Giving the Weight of Lead in Pounds Required for Jointing Cast-Iron Mains.

Diameter of Pipe in Inches.	Weight of Lead in lbs.	Depth of Lead in Inches.	Diameter of Pipe in Inches.	Weight of Lead in lbs.	Depth of Lead in Inches.
1½	1¼	1⅜	11	16½	2¼
2	1¾	1½	12	18½	2⅜
2½	2¼	1⅝	13	21	2⅜
3	2¾	1⅝	14	23½	2⅜
4	4	1¾	15	26	2½
5	5½	1⅞	16	28½	2½
6	7	2	17	31	2½
7	8¾	2	18	32½	2⅝
8	10½	2⅛	19	34	2⅝
9	12½	2⅛	20	35½	2⅝
10	14½	2¼	24	48	3

For pipes 1½ to 8 inches in diameter, the lead is assumed to be about three-eighths of an inch thick; and in pipes 9 inches in diameter and upwards, half an inch thick.

TABLE

Showing the Average Cost per Yard of Laying Mains with Turned and Bored Joints, and with Lead Joints, including the Total Expense of Material (the Pipes excepted), Excavating, Reinstating, and Maintaining the Ground for Six Months afterwards.

Average Depth from the Surface of the Ground to the Upper Side of the Pipe, 1 foot 9 inches.

Diameter in Inches.	2.		2½.		3.		4.		5.		6.		7.		8.		9.	
Description of Joint.	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints	Lead Joints	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
In ordinary ballast	0 7	0 10	0 8	0 11	0 9	1 2	1 0	1 5	1 2	1 7	1 3	1 9	1 6	2 3	1 8	2 5	1 9	2 8
In roads Macadamized with Welsh or lime stone.....	0 9	1 0	0 10	1 1	0 11	1 4	1 2	1 7	1 4	1 9	1 5	1 11	1 8	2 5	1 10	2 7	1 11	2 10
In paved roads (ordinary)...	0 10	1 1	0 11	1 2	1 0	1 5	1 3	1 8	1 5	1 10	1 6	2 0	1 9	2 6	1 11	2 8	2 0	2 11
In footpaths made with ashes, sand, or gravel...	0 5	0 8	0 6	0 9	0 7	1 0	0 8	1 1	1 0	1 5	1 1	1 7	1 3	2 1	1 6	2 3	1 7	2 6
In footpaths flagged	0 7	0 10	0 8	0 11	0 9	1 2	1 0	1 5	1 2	1 7	1 3	1 9	1 6	2 3	1 8	2 5	1 9	2 8
In footpaths asphalted......	1 8	1 11	1 11	2 2	1 11	2 4	2 1	2 6	2 3	2 8	2 4	2 10	2 7	3 4	2 9	3 6	2 10	3 9

Diameter in Inches.	10.		11.		12.		14.		15.		16.		18.		20.		24.	
Description of Joint.	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints	Turned and Bored Joints.	Lead Joints
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
In ordinary ballast	2 0	3 6	2 2	3 4	2 4	3 8	2 9	4 5	3 0	4 11	3 6	5 6	4 1	6 4	5 0	7 9	6 1	8 7
In roads Macadamized with Welsh or lime stone	2 2	3 2	2 4	3 6	2 6	3 10	2 11	4 7	3 2	5 1	3 8	5 8	4 3	6 6	5 2	7 11	6 3	8 9
In paved roads (ordinary) ...	2 3	3 3	2 5	3 7	2 7	3 11	3 0	4 8	3 3	5 2	3 9	5 9	4 4	6 7	5 3	8 0	6 4	8 10
In footpaths made with ashes, sand, or gravel ...	1 10	2 10	2 0	3 2	2 2	3 6	2 7	4 3	2 10	4 9	3 4	5 4	3 11	6 1	4 10	7 7	5 11	8 5
In footpaths flagged	2 0	3 0	2 2	3 4	2 4	3 8	2 9	4 5	3 0	4 11	3 6	5 6	4 1	6 4	5 0	7 9	6 1	8 7
In footpaths asphalted	3 1	4 1	3 3	4 5	3 5	4 9	3 10	5 6	4 1	6 0	4 7	6 7	5 2	7 5	6 1	8 10	7 2	9 8

SERVICE-PIPES.

The following table relating to the size of service-pipes is calculated according to the rule given on page 58. As, however, the actual discharge from small pipes is less than the calculated quantity, the tabular number must be increased by one-third if the service-pipe is of lead, and by one-half if of wrought iron. When of the latter material, it is not advisable to put in the ground a pipe of less than ¾ths of an inch in diameter, owing to its liability to fill up by corrosion.

Example *of the Manner of Using the Table.*—Supposing there are 40 lights to be supplied, at the distance of 70 feet from the main, the tabular number opposite 70 and under 40 is ·73540. To this add one-third if a lead service, making ·98053, and one-half if a wrought-iron service, making 1·10310. The size of pipe next above the numbers is 1 inch and 1¼ inch respectively, and this is the size required.

Table *showing the Diameter of Pipes, in Decimals of an Inch, to Supply Lights at Certain Distances from the Main.* (*Clegg on Coal Gas, 4th Ed., p.* 314)

Distance of Lights from Main in Feet.	Number of Lights, each Burning Five Feet per Hour, with a Pressure of One Inch.						
	3.	5.	10.	15.	20.	25.	30.
5	·15457	·18882	·24912	·29424	·32876	·35946	·38824
10	·17682	·21691	·28617	·33660	·37765	·41291	·44415
15	·19176	·23524	·31034	·36504	·40956	·44779	·48167
20	·20311	·24916	·32872	·38666	·43381	·47429	·51019
30	·22027	·27020	·35649	·41932	·47045	·51438	·55329
40	·23331	·28620	·37760	·44415	·49830	·54483	·58605
50	·24396	·29927	·39483	·46441	·52105	·56970	·61280
60	·25302	·31024	·40950	·48167	·54041	·59086	·63556
70	·26094	·32010	·42231	·49675	·55733	·60936	·65546
80	·26802	·32876	·43375	·51255	·57241	·62585	·67011
90	·27439	·33660	·44408	·52235	·58606	·64077	·68925
100	·28023	·34377	·45354	·53348	·59854	·65442	·70393
150	·30391	·37281	·49185	·57054	·64909	·70970	·76339
200	·32191	·39489	·52098	·61281	·68753	·75173	·80860
250	·33660	·41291	·54476	·64077	·71891	·78604	·84550
300	·34901	·42825	·56507	·66457	·74561	·81523	·87691

Distance of Lights from Main in Feet.	Number of Lights, each Burning Five Feet per Hour, with a Pressure of One Inch.					
	40.	50.	100.	150.	200.	300.
5	·43381	·47430	·62577	·73911	·82581	·97525
10	·49832	·54484	·71881	·83775	·94862	1·1157
15	·54041	·59086	·77954	·91693	1·0288	1·2099
20	·57241	·62585	·82571	·97123	1·0897	1·2815
30	·62076	·67872	·89546	1·0533	1·1817	1·3898
40	·65753	·71891	·94848	1·1156	1·2517	1·4721
50	·68753	·75172	·99177	1·1665	1·3089	1·5393
60	·71307	·77928	1·0286	1·2099	1·3574	1·5965
70	·73540	·80405	1·0608	1·2478	1·3999	1·6464
80	·75530	·82582	1·0895	1·2874	1·4378	1·6910
90	·77331	·84550	1·1155	1·3121	1·4721	1·7313
100	·78978	·86351	1·1394	1·3400	1·5035	1·7681
150	·85649	·93688	1·2356	1·4532	1·6305	1·9175
200	·90720	·99191	1·3088	1·5393	1·7270	2·0311
250	·94862	1·0371	1·3685	1·6095	1·8058	2·1238
300	·98389	1·0757	1·4197	1·6693	1·8729	2·2540

PUBLIC ILLUMINATIONS.

In provincial towns the gas manager is usually called upon to arrange and superintend the illuminations that take place to celebrate any great national or local event. On such occasions the following particulars will be found useful:—

Mode of Supply and Price of Gas.

Illumination devices are generally supplied with gas direct from the main, without the intervention of a meter to register the consumption. Where the illuminations are anything like universal, the fixing of meters is altogether impracticable.

Taking the consumption of each jet to be at the rate of one cubic foot of gas per hour, which is a fair average, the following will be the rate of charge according to the price per 1000 cubic feet:—

At 6s. 6d.	per 1000,	·078	of a penny	per jet	per hour.
6 5	,,	·077	,,	,,	,,
6 4	,,	·076	,,	,,	,,
6 3	,,	·075	,,	,,	,,
6 2	,,	·074	,,	,,	,,
6 1	,,	·073	,,	,,	,,
6 0	,,	·072	,,	,,	,,
5 11	,,	·071	,,	,,	,,
5 10	,,	·070	,,	,,	,,
5 9	,,	·069	,,	,,	,,
5 8	,,	·068	,,	,,	,,
5 7	,,	·067	,,	,,	,,
5 6	,,	·066	,,	,,	,,
5 5	,,	·065	,,	,,	,,
5 4	,,	·064	,,	,,	,,
5 3	,,	·063	,,	,,	,,
5 2	,,	·062	,,	,,	,,
5 1	,,	·061	,,	,,	,,
5 0	,,	·060	,,	,,	,,
4 11	,,	·059	,,	,,	,,
4 10	,,	·058	,,	,,	,,
4 9	,,	·057	,,	,,	,,
4 8	,,	·056	,,	,,	,,
4 7	,,	·055	,,	,,	,,
4 6	,,	·054	,,	,,	,,
4 5	,,	·053	,,	,,	,,
4 4	,,	·052	,,	,,	,,
4 3	,,	·051	,,	,,	,,
4 2	,,	·050	,,	,,	,,
4 1	,,	·049	,,	,,	,,
4 0	,,	·048	,,	,,	,,
3 11	,,	·047	,,	,,	,,
3 10	,,	·046	,,	,,	,,
3 9	,,	·045	,,	,,	,,
3 8	,,	·044	,,	,,	,,
3 7	,,	·043	,,	,,	,,
3 6	,,	·042	,,	,,	,,
3 5	,,	·041	,,	,,	,,
3 4	,,	·040	,,	,,	,,
3 3	,,	·039	,,	,,	,,
3 2	,,	·038	,,	,,	,,
3 1	,,	·037	,,	,,	,,
3 0	,,	·036	,,	,,	,,
2 11	,,	·035	,,	,,	,,
2 10	,,	·034	,,	,,	,,
2 9	,,	·033	,,	,,	,,
2 8	,,	·032	,,	,,	,,

It is proper to stipulate that no illumination should amount to less than 15s. or 20s.

Service or Supply Pipes.

It is a common rule for the gas company to convey at their own cost a service-pipe from the main, and from 8 to 12 feet up the front of the building to be illuminated, provided the whole length of pipe required does not exceed 36 feet. A charge is made for any additional length. The expense of fixing the devices in their position is also charged. To the end of the pipe in front of the building a stop-cock is attached for shutting off or regulating the supply of gas.

Care should be taken to have the pipes of ample capacity, otherwise the illuminations will be poor and ineffective.

When the building to be illuminated is large, it is advisable to run up a service-pipe at each end, and one in the centre, connecting them together in front. Each pipe of course having a distinct connexion with the main in the street.

The service-pipes are temporary only, being lent by the gas company, and are removed by them when the illuminations are over.

Devices.

The devices are paid for by the private inhabitants or the local authorities, or by both, as the case may be.

They may consist of—

Initial letters, single-lined—thus, A—and double-lined—thus, A.
Mottoes—straight, curved, or circular.
Lanterns with coloured devices.
Laurel scrolls.
Garlands.
Festoons.
True-lovers' knots.
Eight-pointed stars.
Brunswick stars.
Crescents.
Plumes.
Crowns.
Shields.
Heraldic crests.
Corporation arms.
Other devices suitable to the particular occasion.

Illuminated Borders.

A very pretty effect, easily managed, and one that gives a rich fulness to the central illuminations of a building, is obtained by running wrought-iron tubing along the principal angles, with holes drilled in the tube at distances of about 6 inches apart, and having small jets or star burners inserted.

The devices are made by the manufacturers of gas-fittings, wrought-iron tubing, and others, and are supplied to gas companies and the trade at about the following prices, net:—

Single-lined Letters, in Iron or Copper, fitted with Strong Union Couplings.

Length of Letter.	Size of Inlet.	Price.
18 inches . .	$\frac{3}{8}$ths inch bore . .	11s. 0d. each.
24 ,, . .	$\frac{3}{8}$,, . .	12 6 ,,
30 ,, . .	$\frac{3}{8}$,, . .	13 6 ,,
36 ,, . .	$\frac{3}{8}$,, . .	15 0 ,,
42 ,, . .	$\frac{1}{2}$,, . .	18 0 ,,
48 ,, . .	$\frac{1}{2}$,, . .	21 0 ,,
54 ,, . .	$\frac{3}{4}$,, . .	25 0 ,,
60 ,, . .	$\frac{3}{4}$,, . .	30 0 ,,

Double-lined Letters in Iron or Copper, fitted with Strong Union Couplings.

Length of Letter.	Size of Inlet.	Price.
18 inches	⅜ths inch bore	12s. 6d. each.
24 ,,	⅜ ,,	15 0 ,,
30 ,,	½ ,,	17 6 ,,
36 ,,	½ ,,	20 0 ,,
42 ,,	¾ ,,	24 0 ,,
48 ,,	¾ ,,	28 0 ,,
54 ,,	1 ,,	33 0 ,,
60 ,,	1 ,,	40 0 ,,

Brunswick Stars and Stars with Eight Points, made of Wrought-Iron Welded Pipe, and fitted up with Strong Union Couplings.

Diameter.	Size of Inlet.	Price with Star Centre. £ s. d.	Price with Shield Centre. £ s. d.	Price with Plume Centre. £ s. d.
3 feet	1 inch bore	2 0 0	2 2 0	2 17 0
4 ,,	1¼ ,,	2 12 0	2 15 0	3 10 0
5 ,,	1¼ ,,	3 6 6	3 10 0	4 5 0
6 ,,	1¼ ,,	4 15 0	5 0 0	5 15 0
7 ,,	1½ ,,	6 3 6	6 10 0	7 5 0
8 ,,	2 ,,	7 7 0	7 15 0	8 10 0

Crowns and plumes cost about one-third more than stars.

Scrolls, garlands, heraldic crests, and other devices, at prices varying according to the elaboration of the design.

Wrought-iron pipes, drilled, and with star jets inserted, are supplied at 20 per cent. discount on the ordinary list price.

The devices may be "home-made," and if so will be less expensive; but unless constructed by skilled and tasteful workmen, they will present a scraggy, irregular appearance when lighted up.

COLOURED FIRES.

A display of coloured fires, at intervals, from prominent points of elevation, adds greatly to the effect of an illumination.

The following are some excellent receipts for their production:—

Lilac Fire.

	Parts		Oz.	Drms.
Chlorate of potash	49 parts,	or	7	13
Sulphur	25 ,,		4	0
Chalk	20 ,,		3	3
Black oxide of copper	6 ,,		1	0

This composition (weight 1 lb.) costs 2s. 3d.

Purple Fire.

	Parts		Oz.	Drms.
Chlorate of potash	43 parts,	or	6	14
Nitrate of potash (saltpetre)	22½ ,,		3	10
Sulphur	22½ ,,		3	10
Black oxide of copper	10 ,,		1	9
Black sulphide of mercury (Ethiop's mineral)	2 ,,		0	5

Weight, 1 lb.; cost, 2s. 3d.

Blue or Bengal Fire.

	Parts		Oz.	Drms.
Dry nitrate of potash	6 parts,	or	10	10½
Sulphur	2 ,,		3	9½
Tersulphide of antimony	1 ,,		1	12

Weight, 1 lb.; cost, 1s.

Green Fire.

		Oz.	Drms.
Nitrate of baryta	77 parts, or	12	5
Sulphur	13 „	2	1
Chlorate of potash	5 „	0	13
Charcoal or lamp black	3 „	0	8
Metallic arsenic	2 „	0	5

Weight, 1 lb.; cost, 1s. 6d.

Yellow Fire.

		Oz.	Drms.
Nitrate of soda	75 parts, or	12	0
Sulphur	19 „	3	1
Charcoal or lamp black	6 „	0	15

Weight, 1 lb.; cost, 1s. 6d.

Crimson Fire.

		Oz.	Drms.
Chlorate of potash	20 parts, or	2	8
Nitrate of strontia	80 „	10	0
Sulphur	22½ „	2	14
Charcoal or lamp black	5 „	0	10

Weight, 1 lb.; cost, 1s. 6d.

Red Fire.

		Oz.	Drms.
Nitrate of strontia	40 parts, or	10	0
Sulphur	13 „	3	2
Chlorate of potash	5 „	1	3
Charcoal or lamp black	3 „	0	11
Sulphide of antimony	4 „	1	0

Weight, 1 lb.; cost, 1s. 6d.

White Indian Fire.

		Oz.	Drms.
Nitrate of potash	24 parts, or	11	10
Sulphur	7 „	3	6
Sulphide of arsenic (Realgar)	2 „	1	0

Weight, 1 lb.; cost, 1s.

In no case should the chlorate of potash be ground along with the sulphur, as ignition, caused by the friction, might ensue.

The ingredients should be reduced to the finest powder, by bruising them in a mortar made of hard wood, the chlorate of potash being ground separately. They should then be intimately mixed together, by passing them three or four times through a hair sieve. When mixed, keep the material in a close stoppered bottle, to prevent spontaneous combustion. All the ingredients must be perfectly dry to ensure success.

The mixtures are best fired in hemispherical dishes or ladles, made of beaten iron, about 5 inches diameter and 2½ inches deep in the centre. The fumes arising from the different fires should be avoided.

A pound in weight of any of the mixtures is sufficient for a fire (though any quantity may be used), and the cost varies from 1s. to 2s. 3d. each. The ingredients can be obtained from almost any chemist and druggist.

LEAD AND COMPOSITION PIPES FOR GAS.

Weights per Yard and Lengths usually Manufactured.

Light.			Heavy.		
Diameter Inside.	Weight per Yard. lbs. ozs.	Lengths of Bundles usually Manufactured.	Diameter Inside.	Weight per Yard. lbs. ozs.	Lengths of Bundles usually Manufactured.
¼ inch.	0 11½	80 yards.	¼ inch.	0 15	67 yards.
⅜ „	1 2	60 „	⅜ „	1 6½	46 „
½ „	2 0	32 „	½ „	2 10	26 „
¾ „	3 3	23 „	¾ „	3 12	19 „
1 „	4 8	26 „	1 „	6 0	20 „
1¼ „	8 0	16 „	1¼ „	10 0	12 „
1½ „	12 0	10 „	1½ „	14 0	9 „
2 „	18 0	5 „	2 „	21 0	5 „

SOLDERS.

Fine Solder is an alloy of two parts of block tin and one part of lead. This is used for fine work, such as soldering the drums of meters, for pewter, &c.

Glazing Solder.—Equal parts of block tin and lead. Used for lead.

Plumbing Solder.—One part block tin, two parts lead. For all kinds of plumbers' joints and for tin.

Brazing Solder.—Hard: one part copper, one part zinc. Soft: four parts copper, three parts zinc, one part block tin.

The more lead solder contains the coarser its quality, and *vice versâ.*

FLUXES FOR SOLDERING.

Iron and steel	Borax or sal ammoniac.
Tinned iron	Resin or chloride of zinc.
Copper and brass	Sal ammoniac or chloride of zinc.
Lead	Resin or tallow.
Lead and composition pipes	Resin and sweet oil.
Zinc	Chloride of zinc.

LEAKAGE.

The great majority of leakages occur in the service-pipes—either in the pipe itself, by corrosion, or at its junction with the main. Two-inch cast-iron mains, from their small diameter, are often found to be split where the service-pipe is inserted.

WROUGHT-IRON PIPES,

To be good, should be perfectly round, with no ribs or flat places. The welding should be scarcely discernible from the other parts, and the screw at the ends should be equally deep throughout the thread.

PRICE LIST OF WROUGHT-IRON TUBING AND FITTINGS.

Internal Diam.	3 in.	2¾ in.	2½ in.	2¼ in.	2 in.	1¾ in.	1½ in.	1¼ in.	1 in.	¾ in.	½ in.	⅜ in.	¼ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Tubes, from 2 to 14 feet..per ft.	4 9	4 3	3 6	2 6	1 8	1 6	1 1	0 10	0 7	0 5	0 4¼	0 3¾	0 3¼
Short Pieces, und. 2 ft. .each	9 0	8 0	6 3	4 6	3 0	2 8	2 0	1 6	1 1	0 9	0 8	0 7	0 6
Connecting do., or Long Screws	10 6	9 0	7 3	5 3	4 0	3 0	2 3	2 0	1 6	1 2	0 11	0 9	0 8
Bends and Spgs.	19 0	15 6	11 0	6 6	4 3	3 3	2 3	1 9	1 3	0 11	0 8	0 7	0 6½
Square Elbows*	16 3	13 3	9 3	5 0	3 9	3 3	2 3	1 9	1 3	0 10	0 8	0 7	0 6½
Tees, Equal or Diminishing .	18 0	14 6	10 6	5 6	4 0	3 6	2 6	2 0	1 6	1 1	0 9	0 7	0 6½
Crosses, Equal or Diminishing	29 0	23 0	17 3	9 6	4 9	4 3	3 6	3 0	2 3	1 9	1 5	1 1	1 0
Nipples and Backnuts	4 3	3 3	2 6	2 3	1 3	1 1	0 9	0 8	0 6	0 5	0 4½	0 4½	0 4
Sockets, plain .	5 0	4 0	2 9	1 6	1 0	0 10	0 8	0 7	0 5	0 4	0 3	0 3	0 2½
Iron Main Cocks	64 0	55 0	45 6	36 6	28 3	24 6	18 3	13 9	9 0	7 6	..	..	..
Do., with Brass Plugs........	..	..	..	..	48 9	45 0	30 0	22 0	14 0	10 6	7 6	6 6	6 6
Caps..........	5 6	4 6	3 3	2 3	1 3	1 1	0 9	0 8	0 6	0 5	0 4½	0 4½	0 4
Plugs.........	5 0	3 6	2 3	1 8	1 1	0 10	0 8	0 7	0 5	0 4½	0 4	0 4	0 4
Diminishing Sockets	6 0	4 9	3 3	2 1	1 3	1 1	0 9	0 8	0 6	0 5	0 4½	0 4	0 3½
Flanges.......	8 6	6 9	5 0	3 9	2 6	1 11	1 9	1 6	1 4	1 2	1 0	0 10	..

* Equal or diminishing round elbows, 5 per cent. extra.

Discount.				
	Gas tubes and fittings,	60	per cent.	and upwards.
	Galvanized ,,	40	,,	,,
	Steam and water ,,	40	,,	,,
	Galvanized ,,	20	,,	,,

PRESSURE AND CONSUMPTION.

By doubling the amount of pressure, the consumption of gas is increased by about one-half.

EXPOSED WATER-PIPES.

On the approach of winter all exposed water-pipes about the works should be thickly lapped with straw or other material, to exclude the frost.

SERVICE-PIPES.

If the distance from the main to the meter does not exceed 30 yards, the following sizes of service-pipes will supply the number of lights named:—

1 to 10 lights . . . . ¾ inch wrought-iron tube.
11 ,, 30 ,, ... 1 ,, ,,
31 ,, 60 ,, ... 1¼ ,, ,,
61 ,, 120 ,, ... 1½ ,, ,,
121 ,, 200 ,, ... 2 ,, ,,

The above sizes allow for partial contraction of the area of the pipe by corrosion. Wrought-iron tubes of less than ¾-inch bore ought never to be put into the ground.

WATER-SLIDE PENDANTS.

A tea-spoonful of salad oil added to the water in the hydraulic tube of a water-slide pendant tends, in a great measure, to prevent evaporation of the water, and consequent leakage.

CEMENTS.

Iron Cements for Flange and Open Socket Joints.

1 lb. clean iron borings, pounded fine in a mortar.
2 oz. sal ammoniac (muriate of ammonia) in powder.
1 oz. flowers of sulphur.

Mix the whole together by pounding, and keep dry. For use, mix one part with twenty of iron borings pounded, adding water to the consistence of mortar.

98 parts fine iron borings.
1 part flowers of sulphur.
1 part sal ammoniac.

Mix, and when required for use dissolve in boiling water. This cement sets quickly.

If required to set slowly, which makes the better joint—

197 parts iron borings.
1 part flowers of sulphur.
2 parts sal ammoniac.

When required for use, mix with boiling water.

The iron borings used for making joints should be perfectly free from grease or oil.

Cements for Jointing Clay Retort Mouthpieces.

20 lbs. gypsum (sulphate of lime) made into a pulp with water.
10 lbs. iron borings, saturated with a strong solution of sal ammoniac.

Mix well together till of a consistency fit for use.

Three-fourths fire-clay.
One-fourth iron borings.

When ready to connect, mix with ammoniacal water. Use no sulphur.

Cement for Joining the Ends of Clay Retorts.

10 lbs. gypsum made into a pulp with water.
20 lbs. iron borings, saturated with a strong solution of sal ammoniac.

Mix well together till of a consistency fit for use.

Some engineers use fire-clay alone, mixed with water to the consistency of mortar.

Cement or Luting for Retort-Lids.

Ordinary lime, or spent lime from the purifiers, mixed with fire-clay or common clay, and worked up into mortar.

The following makes a tough persistent luting :—

1 part lime,
2 parts moulding sand,

ground up together, with water, in a mortar-mill.

Cement for Turned and Bored Joints.

1 part white lead.
1 part red lead.

Mix with boiled linseed oil to the proper consistency.

Glue Cements to Resist Moisture.

1 part glue.
1 part black resin.
¼ part red ochre.

Mix with the least possible quantity of water.

4 parts glue.
1 part boiled oil.
1 part oxide of iron.

Mix with as little water as possible.

Mastic Cement for Buildings.

1 part red lead.	1 part red lead.
5 parts ground lime.	5 parts whiting.
5 parts sharp sand.	10 parts sharp sand.
Mix with boiled oil.	Mix with boiled oil.

MORTAR AND CONCRETE.

Mortar.

1 part lime.
3 parts sharp river sand.

1 part lime.
2 parts sand.
1 part blacksmiths' ashes or coarsely ground coke.

Coarse Mortar.

1 part lime.
4 parts coarse sand.

Hydraulic Mortar.

1 part blue lias lime,
2½ parts burnt clay,
ground together in a mortar-mill; or,
1 part blue lias lime,
6 parts sharp sand,
1 part puzzolana,
ground together.

Concrete.

1 part lime,
4 parts gravel,
2 parts sand.

Clean sharp sand (not having its particles rounded by attrition) should always be used in the composition of mortar when it can be procured; but, otherwise, clean well-burnt ashes may be substituted.

The more sand that can be incorporated with the lime the better the mortar, provided the necessary degree of plasticity is preserved.

A load of mortar is equal to 1 cubic yard.
A hod of mortar measures 9 in. × 9 in. × 14 in.
Two hods of mortar are nearly equal to a bushel.
The mortar in a rod of brickwork (4500 bricks) is taken at 1½ cwt. of chalk lime and 2 loads of sand, or 1 cwt. of stone lime and 2½ loads of sand.

INSPECTION OF METERS.

A meter inspector is able to stock and water, on an average, 80 wet meters per day.

Working Hours—8.30 a.m. to 5.30 p.m., with an interval of one hour for dinner.
On Saturdays—8.30 a.m. to 1.0 p.m.

TABLE

Showing the usual Dimensions of the Measuring Wheels or Drums of Station-Meters for Passing the Quantities of Gas mentioned in the First Column of the Table, at the Ordinary Speed of 100 *Revolutions per Hour; that Velocity being found most Suitable for the Action of the Meters.* (*Clegg*, 4*th Ed.*, *p.* 226.)

Quantity Measured per Hour.	Quantity per Revolution in Cubic Feet.	Diameter of Wheel or Drum.	Length of Wheel or Drum, *minus* Hollow Cover.
750	7·5	2·6	2·0
1,000	10	2·8	2·6¼
1,500	15	3·0	3·0
2,000	20	3·4	3·2⅛
3,000	30	4·0	3·5⅛
4,000	40	4·6	3·8
4,500	45	4·6	3·11¾
5,000	50	5·0	3·7½
6,000	60	5·0	4·3
8,000	80	5·6	4·7¾
10,000	100	6·0	4·11½
12,000	120	6·6	5·2¾
15,000	150	7·0	5·8
20,000	200	7·6	6·5
30,000	300	9·0	6·11½
40,000	400	9·0	8·3
50,000	500	10·6	8·8¾
60,000	600	11·0	9·11½
80,000	800	12·0	9·8¼
100,000	1000	13·0	11·4

TABLE

Showing the Number of Hours during which Gas is usually Burnt in each Month, Quarter, and Year, according to the Times of Lighting and Extinguishing.

Times of Lighting and Extinguishing.	Lady-Day Quarter.			Midsummer Quarter.			Michaelmas Quarter.			Christmas Quarter.			Lady-Day.	Midsummer.	Michaelmas.	Christmas.	Total of Year.*
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.					
If lighted at dusk and extinguished at—																	
6 p.m.	65	33	4	..	..	..	..	..	2	31	62	80	102	..	2	173	277
7 ,,	96	61	31	4	..	..	..	14	22	62	92	111	188	4	36	265	493
8 ,,	127	89	62	28	4	..	..	40	52	93	122	142	278	32	92	357	759
9 ,,	158	117	93	58	29	8	13	71	82	124	152	173	368	95	166	449	1078
10 ,,	189	145	124	88	60	38	44	102	112	155	182	204	458	186	258	541	1443
11 ,,	220	173	155	118	91	68	75	133	142	186	212	235	548	277	350	633	1808
12 ,,	251	201	186	148	122	98	106	164	172	217	242	266	638	368	442	725	2173
All night	512	411	382	295	242	195	217	307	345	421	473	527	1305	732	869	1421	4327
Lighted at—																	
4 a.m. till daylt.	137	98	71	28	2	..	..	16	48	80	110	137	306	30	64	327	727
5 ,, ,,	106	70	40	3	..	..	..	..	18	49	80	106	216	3	18	235	472
6 ,, ,,	75	42	9	..	..	..	..	..	..	18	50	75	126	..	..	143	269
7 ,, ,,	44	14	..	..	..	..	..	..	..	..	20	44	58	..	..	64	122

* A deduction of one-sixth may be made for moonlight nights; and in the case of private lamps not being lighted on Sundays, deduct one-seventh.

PUBLIC LAMPS—THEIR DISTANCE APART.

In London the distance apart of the public street lamps averages 68 yards.

PUBLIC LAMP SERVICE-PIPES.

A ⅜-inch lead pipe does not do for running up the interior of a lamp-column. In cold districts the condensed moisture in a pipe of this small bore becomes frozen, filling up the entire length with solid ice in a very short space of time.

TABLE

Showing the Consumption of Gas by One Burner per Month, and for the Twelve Months, during the Average Hours of Burning from Sunset throughout the Year.

Month.	Average Time of Sunset.	Mean Duration of Hours of Burning.	Number of Hours of Night per Month.	Consumption of Gas by One Burner per Month, and for the whole Year. Public Street Lamps assumed to be Lighted from Sunset to Sunrise, and Private Lamps from Sunset until Nine o'Clock.									
				3 Cubic Feet per Hour.		3½ Cubic Feet per Hour.		4 Cubic Feet per Hour.		4½ Cubic Feet per Hour.		5 Cubic Feet per Hour.	
				Public Lamps.	Priv. Lmps.	Public Lamps.	Priv. Lmps.	Public Lamps.	Priv. Lmps.	Public Lamps.	Priv. Lmps.	Public Lamps.	Priv. Lmps.
	h. m.	h. m.	h.	c. ft.	c. ft.	c. ft.	c. ft.	c. ft.	c. ft.	c. ft.	c. ft.	c. ft.	c. ft.
January.	4 13	16 31	512	1536	445	1792	519	2048	594	2304	668	2560	742
February	5 7	14 41	411	1233	326	1438	380	1644	436	1850	490	2055	544
March. .	6 6	12 19	382	1146	270	1337	315	1528	360	1719	405	1910	450
April . .	6 57	9 50	295	885	185	1032	216	1180	246	1327	277	1475	308
May . .	7 46	7 48	242	726	115	847	134	968	154	1089	173	1210	191
June . .	8 16	6 30	195	585	..	683	..	780	..	878	..	975	..
July . .	8 2	7 0	217	651	..	760	..	868	..	976	..	1085	..
August .	7 16	9 54	307	921	162	1074	190	1228	216	1382	242	1535	268
Septmbr.	6 20	11 30	345	1035	240	1207	280	1380	320	1552	360	1425	400
October .	5 21	13 35	421	1263	340	1474	396	1684	453	1895	509	2105	566
Novmbr.	4 25	15 46	473	1419	413	1655	481	1892	550	2128	619	2665	688
Decmbr.	3 49	17 0	527	1581	483	1845	564	2108	644	2372	725	2635	803
Total for the Year	..	..	4327	12,981	2979	15,144	3475	17,308	3973	19,472	4469	21,635	4960

TABLE

Showing the Dilatation of Gas in Contact with Water and Saturated with Aqueous Vapour, for given Temperatures. (Professor Airy.)

Temperature in Fahrenheit's Scale.	Per Centage of Dilatation.	Temperature in Fahrenheit's Scale.	Per Centage of Dilatation.	Temperature in Fahrenheit's Scale.	Per Centage of Dilatation.
31·40	0	54·33	5½	74·30	11
33·54	½	56·24	6	75·94	11½
35·70	1	58·12	6½	77·23	12
37·84	1½	60·02	7	78·81	12½
39·91	2	62·00	7½	80·40	13
42·05	2½	63·77	8	81·94	13½
44·17	3	65·63	8½	83·44	14
46·22	3½	67·43	9	84·88	14½
48·25	4	69·18	9½	86·39	15
50·32	4½	70·90	10	87·83	15½
52·36	5	72·60	10½	89·20	16

NOTE.—The table shows the per centage of increase of the volume of gas above its volume at the temperature of 31·4° Fahr.

PHOTOMETER TABLE.

Calculated for One Candle. (*Mr. Sugg.*)*

Rule.—Multiply the number standing beneath the number of grains consumed by the candle, and opposite the number of feet consumed by the gas-burner, by the illuminating power as read off from the scale of the photometer; the product is the correct value of the gas reduced to the standards of 120 grains per hour and 5 cubic feet per hour.

Consumption of Gas. Feet per Hour.	Grains per Hour Consumed by the Sperm Candle.								
	110	111	112	113	114	115	116	117	118
4·5	1·01851	1·02777	1·03703	1·04629	1·05555	1·06481	1·07407	1·08333	1·09259
4·6	·99637	1·00543	1·01449	1·02355	1·03260	1·04166	1·05072	1·05978	1·06884
4·7	·97517	·98404	·99290	1·00177	1·01063	1·01950	1·02836	1·03723	1·04609
4·8	·95486	·96354	·97222	·98090	·98958	·99826	1·00694	1·01562	1·02430
4·9	·93537	·94387	.95238	·96088	·96938	·97789	·98639	·99489	1·00340
5·0	·91666	·92500	·93333	·94166	·95000	·95833	·96666	·97499	·98333
5·1	·89869	·90686	·91503	·92320	·93137	·93954	·94771	·95588	·96405
5·2	·88141	·88942	·89743	·90544	·91346	·92147	·92948	·93750	·94551
5·3	·86477	·87264	·88050	·88836	·89622	·90408	·91194	·91981	·92767
5·4	·84876	·85648	·86419	·87191	·87962	·88734	·89506	·90277	·91049
5·5	·83333	·84090	·84848	·85606	·86363	·87121	·87878	·88636	·89393

Consumption of Gas. Feet per Hour.	Grains per Hour Consumed by the Sperm Candle.								
	119	120	121	122	123	124	125	126	127
4·5	1·10185	1·11111	1·12037	1·12962	1·13888	1·14814	1·15740	1·16666	1·17592
4·6	1·07789	1·08695	1·09601	1·10507	1·11413	1·12318	1·13224	1·14130	1·15036
4·7	1·05496	1·06383	1·07269	1·08156	1·09042	1·09929	1·10815	1·11702	1·12588
4·8	1·03298	1·04166	1·05034	1·05902	1·06770	1·07638	1·08506	1·09375	1·10243
4·9	1·01190	1·02040	1·02891	1·03741	1·04591	1·05442	1·06292	1·07142	1·07993
5·0	·99166	1·00000	1·00833	1·01666	1·02499	1·03333	1·04166	1 04999	1·05832
5·1	·97222	·98039	·98856	·99673	1·00490	1·01307	1·02124	1·02941	1·03758
5·2	·95352	·96153	·96955	·97756	·98557	·99358	1·00160	1·00961	1·01762
5·3	·93553	·94339	·95125	·95911	·96698	·97484	·98270	·99056	·99842
5·4	·91820	·92592	·93364	·94135	·94907	·95679	·96450	·97222	·97993
5·5	·90151	·90909	·91666	·92424	·93181	·93939	·94696	·95454	·96212

Consumption of Gas. Feet per Hour.	Grains per Hour Consumed by the Sperm Candle.								
	128	129	130	131	132	133	134	135	..
4·5	1·18518	1·19444	1·20370	1·21296	1·22222	1·23148	1·24074	1·25000	..
4·6	1·15942	1·16847	1·17753	1·18659	1·19565	1·20471	1·21376	1·22282	..
4·7	1·13475	1·14361	1·15248	1·16134	1·17021	1·17907	1·18794	1·19680	..
4·8	1·11111	1·11979	1·12847	1·13715	1·14583	1·15451	1·16319	1·17187	..
4·9	1·08843	1·09693	1·10544	1·11394	1·12244	1·13095	1·13945	1·14795	..
5·0	1·06666	1·07500	1·08333	1·09166	1·10000	1·10833	1·11666	1·12500	..
5·1	1·04575	1·05392	1·06209	1·07026	1·07843	1·08660	1·09477	1·10294	..
5·2	1·02564	1·03365	1·04166	1·04967	1·05769	1·06570	1·07371	1·08173	..
5·3	1·00628	1·01415	1·02201	1·02987	1·03773	1·04559	1·05345	1·06132	..
5·4	·98765	·99537	1·00308	1·01080	1·01851	1·02623	1·03395	1·04166	..
5·5	·96969	·97727	·98484	·99242	1·00000	1·00757	1·01515	1·02272	..

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* Mr. Sugg has also published, in a book form, a series of useful photometrical tables from 9·5 to 20 candles.

TABLE

Showing the Per Centage of Error in Meters according as their Registration differs from that of the Test Gasholders.

The sign + is used to indicate *fast*, and – to indicate *slow*.

Meters not exceeding 2 per cent. fast, or 3 per cent. slow, are correct within the meaning of the "Sales of Gas Act."

Meter Registering 1 Foot.		Meter Registering 2 Feet.		Meter Registering 3 Feet.		Meter Registering 3 Feet.	
Reading of Scale of Gasholder.	**Amount of Error.**	**Reading of Scale of Gasholder.**	**Amount of Error.**	**Reading of Scale of Gasholder.**	**Amount of Error.**	**Reading of Scale of Gasholder.**	**Amount of Error.**
Foot	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.
0·90	+ 11·11	1·80	+ 11·11	2·70	+ 11·11	3·16	– 5·06
·91	+ 9·89	·81	+ 10·50	·71	+ 10·70	·17	– 5·36
·92	+ 8·70	·82	+ 9·89	·72	+ 10·30	·18	– 5·66
·93	+ 7·25	·83	+ 9·29	·73	+ 9·89	·19	– 5·85
·94	+ 6·36	·84	+ 8·70	·74	+ 9·49	3·20	– 6·25
·95	+ 5·26	·85	+ 8·11	·75	+ 9·09	·21	– 6·54
·96	+ 4·17	·86	+ 7·53	·76	+ 8·70	·22	– 6·82
·97	+ 3·09	·87	+ 6·95	·77	+ 8·31	·23	– 7·12
·98	+ 2·04	·88	+ 6·38	·78	+ 7·92	·24	– 7·41
·99	+ 1·01	·89	+ 5·82	·79	+ 7·53	·25	– 7·70
1·00	Nil.	1·90	+ 5·26	2·80	+ 7·14	·26	– 7·98
·01	– 1·00	·91	+ 4·71	·81	+ 6·76	·27	– 8·26
·02	– 1·97	·92	+ 4·17	·82	+ 6·38	·28	– 8·54
·03	– 2·92	·93	+ 3·63	·83	+ 6·01	·29	– 8·82
·04	– 3·85	·94	+ 3·09	·84	+ 5·63	3·30	– 9·09
·05	– 4·74	·95	+ 2·56	·85	+ 5·26	·31	– 9·36
·06	– 5·66	·96	+ 2·04	·86	+ 4·89	·32	– 9·64
·07	– 6·54	·97	+ 1·52	·87	+ 4·53	·33	– 9·91
·08	– 7·40	·87	+ 1·01	·88	+ 4·17	·34	– 10·18
·09	– 8·26	·99	+ 0·50	·89	+ 3·81		
1·10	– 9·10	2·00	Nil.	2·90	+ 3·45		
·11	– 9·91	·01	– 0·50	·91	+ 3·09		
·12	– 10·07	·02	– 0·99	·92	+ 2·74		
		·03	– 1·48	·93	+ 2·39		
		·04	– 1·96	·94	+ 2·04		
		·05	– 2·44	·95	+ 1·69		
		·06	– 2·91	·96	+ 1·35		
		·07	– 3·38	·97	+ 1·01		
		·08	– 3·85	·98	+ 0·67		
		·09	– 4·31	·99	+ 0·33		
		2·10	– 4·76	3·00	Nil.		
		·11	– 5·21	·01	– 0·33		
		·12	– 5·66	·02	– 0·66		
		·13	– 6·10	·03	– 0·99		
		·14	– 6·54	·04	– 1·32		
		·15	– 6·98	·05	– 1·64		
		·16	– 7·41	·06	– 1·96		
		·17	– 7·83	·07	– 2·28		
		·18	– 8·26	·08	– 2·60		
		·19	– 8·68	·09	– 2·91		
		2·20	– 9·09	3·10	– 3·22		
		·21	– 9·50	·11	– 3·54		
		·22	– 9·91	·12	– 3·85		
		·23	– 10·31	·13	– 4·16		
		·24	– 10·71	·14	– 4·46		
		·25	– 11·11	·15	– 4·76		

Meter Registering 5 Feet.		Meter Registering 5 Feet.		Meter Registering 5 Feet.		Meter Registering 10 Feet.	
Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.
Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.
4·50	+11.11	5·01	− 0·20	5·52	− 9·42	9·00	+11·11
·51	+10·86	·02	− 0·40	·53	− 9·59	·01	+10·99
·52	+10·62	·03	− 0·60	·54	− 9·75	·02	+10·86
·53	+10·38	·04	− 0·79	·55	− 9·91	·03	+10·74
·54	+10·13	·05	− 0·99	·56	−10·07	·04	+10·62
·55	+ 9·89	·06	− 1·19	·57	−10·23	·05	+10·50
·56	+ 9·65	·07	− 1·38	·58	−10·39	·06	+10·38
·57	+ 9·41	·08	− 1·57	·59	−10·55	·07	+10·25
·58	+ 9·17	·09	− 1·77	5·60	−10·71	·08	+10·13
·59	+ 8·93	5·10	− 1·96	·61	−10·87	·09	+10·01
4·60	+ 8·70	·11	− 2·15	·62	−11·03	9·10	+ 9·89
·61	+ 8·46	·12	− 2·34	·63	−11·19	·11	+ 9·77
·62	+ 8·23	·13	− 2·53			·12	+ 9·65
·63	+ 7·99	·14	− 2·72			·13	+ 9·53
·64	+ 7·76	·15	− 2·91			·14	+ 9·41
·65	+ 7·53	·16	− 3·10			·15	+ 9·29
·66	+ 7·30	·17	− 3·29			·16	+ 9·17
·67	+ 7·07	·18	− 3·47			·17	+ 9·05
·68	+ 6·84	·19	− 3·66			·18	+ 8·93
·69	+ 6·61	5·20	− 3·85			·19	+ 8·81
4·70	+ 6·38	·21	− 4·03			9·20	+ 8·70
·71	+ 6·16	·22	− 4·21			·21	+ 8·58
·72	+ 5·93	·23	− 4·40			·22	+ 8·46
·73	+ 5·71	·24	− 4·58			·23	+ 8·34
·74	+ 5·49	·25	− 4·76			·24	+ 8·23
·75	+ 5·26	·26	− 4·94			·25	+ 8·11
·76	+ 5·04	·27	− 5·12			·26	+ 7·99
·77	+ 4·82	·28	− 5·30			·27	+ 7·87
·78	+ 4·60	·29	− 5·48			·28	+ 7·76
·79	+ 4·38	5·30	− 5·66			·29	+ 7·64
4·80	+ 4·17	·31	− 5·84			9·30	+ 7·53
·81	+ 3·95	·32	− 6·02			·31	+ 7·41
·82	+ 3·73	·33	− 6·19			·32	+ 7·30
·83	+ 3·52	·34	− 6·37			·33	+ 7·18
·84	+ 3·31	·35	− 6·54			·34	+ 7·07
·85	+ 3·09	·36	− 6·72			·35	+ 6·95
·86	+ 2·88	·37	− 6·89			·36	+ 6·84
·87	+ 2·67	·38	− 7·06			·37	+ 6·72
·88	+ 2·46	·39	− 7·24			·38	+ 6·61
·89	+ 2·25	5·40	− 7·41			·39	+ 6·50
4·90	+ 2·04	·41	− 7·58			9·40	+ 6·38
·91	+ 1·83	·42	− 7·75			·41	+ 6·27
·92	+ 1·63	·43	− 7·92			·42	+ 6·16
·93	+ 1·42	·44	− 8·09			·43	+ 6·04
·94	+ 1·21	·45	− 8·26			·44	+ 5·93
·95	+ 1·01	·46	− 8·42			·45	+ 5·82
·96	+ 0·81	·47	− 8·59			·46	+ 5·71
·97	+ 0·60	·48	− 8·76			·47	+ 5·60
·98	+ 0·40	·49	− 8·93			·48	+ 5·49
·99	+ 0·20	5·50	− 9·09			·49	+ 5·37
5·00	Nil.	·51	− 9·26			9·50	+ 5·26

Meter Registering 10 Feet.		Meter Registering 10 Feet.		Meter Registering 10 Feet.		Meter Registering 10 Feet.	
Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.
Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.
9·51	+ 5·15	10·02	− 0·20	10·53	− 5·03	11·04	− 9·42
·52	+ 5·04	·03	− 0·30	·54	− 5·12	·05	− 9·51
·53	+ 4·93	·04	− 0·40	·55	− 5·21	·06	− 9·59
·54	+ 4·82	·05	− 0·50	·56	− 5·30	·07	− 9·67
·55	+ 4·71	·06	− 0·60	·57	− 5·39	·08	− 9·75
·56	+ 4·60	·07	− 0·70	·58	− 5·48	·09	− 9·83
·57	+ 4·49	·08	− 0·79	·59	− 5·57	11·10	− 9·91
·58	+ 4·38	·09	− 0·89	10·60	− 5·66	·11	− 9·99
·59	+ 4·28	10·10	− 0·99	·61	− 5·75	·12	−10·07
9·60	+ 4·17	·11	− 1·09	·62	− 5·84	·13	−10·15
·61	+ 4·06	·12	− 1·19	·63	− 5·93	·14	−10·23
·62	+ 3·95	·13	− 1·28	·64	− 6·02	·15	−10·31
·63	+ 3·84	·14	− 1·38	·65	− 6·10	·16	−10·39
·64	+ 3·73	·15	− 1·48	·66	− 6·19	·17	−10·47
·65	+ 3·63	·16	− 1·57	·67	− 6·28	·18	−10·55
·66	+ 3·52	·17	− 1·67	·68	− 6·37	·19	−10·63
·67	+ 3·41	·18	− 1·77	·69	− 6·45	11·20	−10·71
·68	+ 3·31	·19	− 1·86	10·70	− 6·54	·21	−10·79
·69	+ 3·20	10·20	− 1·96	·71	− 6·63	·22	−10·87
9·70	+ 3·09	·21	− 2·06	·72	− 6·72	·23	−10·95
·71	+ 2·99	·22	− 2·15	·73	− 6·80	·24	−11·03
·72	+ 2·88	·23	− 2·25	·74	− 6·89	·25	−11·11
·73	+ 2·77	·24	− 2·34	·75	− 6·98		
·74	+ 2·67	·25	− 2·44	·76	− 7·06		
·75	+ 2·56	·26	− 2·53	·77	− 7·15		
·76	+ 2·46	·27	− 2·63	·78	− 7·24		
·77	+ 2·35	·28	− 2·72	·79	− 7·32		
·78	+ 2·25	·29	− 2·82	10·80	− 7·41		
·79	+ 2·15	10·30	− 2·91	·81	− 7·49		
9·80	+ 2·04	·31	− 3·01	·82	− 7·58		
·81	+ 1·94	·32	− 3·10	·83	− 7·66		
·82	+ 1·83	·33	− 3·19	·84	− 7·75		
·83	+ 1·73	·34	− 3·29	·85	− 7·83		
·84	+ 1·63	·35	− 3·38	·86	− 7·92		
·85	+ 1·52	·36	− 3·47	·87	− 8·00		
·86	+ 1·42	·37	− 3·57	·88	− 8·09		
·87	+ 1·32	·38	− 3·66	·89	− 8·17		
·88	+ 1·21	·39	− 3·75	10·90	− 8·26		
·89	+ 1·11	10·40	− 3·85	·91	− 8·34		
9·90	+ 1·01	·41	− 3·94	·92	− 8·42		
·91	+ 0·91	·42	− 4·03	·93	− 8·51		
·92	+ 0·81	·43	− 4·12	·94	− 8·59		
·93	+ 0·70	·44	− 4·21	·95	− 8·68		
·94	+ 0·60	·45	− 4·31	·96	− 8·76		
·95	+ 0·50	·46	− 4·40	·97	− 8·84		
·96	+ 0·40	·47	− 4·49	·98	− 8·93		
·97	+ 0·30	·48	− 4·58	·99	− 9·01		
·98	+ 0·20	·49	− 4·67	11·00	− 9·09		
·99	+ 0·10	10·50	− 4·76	·01	− 9·18		
10·00	Nil.	·51	− 4·85	·02	− 9·26		
·01	− 0·10	·52	− 4·94	·03	− 9·34		

Meter Registering 20 Feet.		Meter Registering 20 Feet.		Meter Registering 20 Feet.		Meter Registering 20 Feet.	
Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.
Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.
18·00	+11·11	18·51	+ 8·05	19·02	+ 5·15	19·53	+ 2·40
·01	+11·05	·52	+ 7·99	·03	+ 5·09	·54	+ 2·35
·02	+10·99	·53	+ 7·93	·04	+ 5·04	·55	+ 2·30
·03	+10·92	·54	+ 7·87	·05	+ 4·98	·56	+ 2·25
·04	+10·86	·55	+ 7·82	·06	+ 4·93	·57	+ 2·20
·05	+10·80	·56	+ 7·76	·07	+ 4·87	·58	+ 2·15
·06	+10·74	·57	+ 7·70	·08	+ 4·82	·59	+ 2·09
·07	+10·68	·58	+ 7·64	·09	+ 4·76	19·60	+ 2·04
·08	+10·62	·59	+ 7·59	19·10	+ 4·71	·61	+ 1·99
·09	+10·56	18·60	+ 7·53	·11	+ 4·65	·62	+ 1·94
18·10	+10·50	·61	+ 7·47	·12	+ 4·60	·63	+ 1·88
·11	+10·44	·62	+ 7·41	·13	+ 4·54	·64	+ 1·83
·12	+10·38	·63	+ 7·36	·14	+ 4·49	·65	+ 1·78
·13	+10·31	·64	+ 7·30	·15	+ 4·43	·66	+ 1·73
·14	+10·25	·65	+ 7·24	·16	+ 4·38	·67	+ 1·68
·15	+10·19	·66	+ 7·18	·17	+ 4·33	·68	+ 1·63
·16	+10·13	·67	+ 7·13	·18	+ 4·28	·69	+ 1·57
·17	+10·07	·68	+ 7·07	·19	+ 4·22	19·70	+ 1·52
·18	+10·01	·69	+ 7·01	19·20	+ 4·17	·71	+ 1·47
·19	+ 9·95	18·70	+ 6·95	·21	+ 4·11	·72	+ 1·42
18·20	+ 9·89	·71	+ 6·90	·22	+ 4·06	·73	+ 1·37
·21	+ 9·83	·72	+ 6·84	·23	+ 4·00	·74	+ 1·32
·22	+ 9·77	·73	+ 6·78	·24	+ 3·95	·75	+ 1·26
·23	+ 9·71	·74	+ 6·72	·25	+ 3·89	·76	+ 1·21
·24	+ 9·65	·75	+ 6·66	·26	+ 3·84	·77	+ 1·16
·25	+ 9·59	·76	+ 6·61	·27	+ 3·78	·78	+ 1·11
·26	+ 9·53	·77	+ 6·55	·28	+ 3·73	·79	+ 1·06
·27	+ 9·47	·78	+ 6·50	·29	+ 3·68	19·80	+ 1·01
·28	+ 9·41	·79	+ 6·44	19·30	+ 3·63	·81	+ 0·96
·29	+ 9·35	18·80	+ 6·38	·31	+ 3·57	·82	+ 0·91
18·30	+ 9·29	·81	+ 6·32	·32	+ 3·52	·83	+ 0·86
·31	+ 9·23	·82	+ 6·27	·33	+ 3·46	·84	+ 0·81
·32	+ 9·17	·83	+ 6·21	·34	+ 3·41	·85	+ 0·75
·33	+ 9·11	·84	+ 6·16	·35	+ 3·36	·86	+ 0·70
·34	+ 9·05	·85	+ 6·10	·36	+ 3·31	·87	+ 0·65
·35	+ 8·99	·86	+ 6·04	·37	+ 3·25	·88	+ 0·60
·36	+ 8·93	·87	+ 5·98	·38	+ 3·20	·89	+ 0·55
·37	+ 8·87	·88	+ 5·93	·39	+ 3·14	19·90	+ 0·50
·38	+ 8·81	·89	+ 5·87	19·40	+ 3·09	·91	+ 0·45
·39	+ 8·76	18·90	+ 5·82	·41	+ 3·04	·92	+ 0·40
18·40	+ 8·70	·91	+ 5·76	·42	+ 2·99	·93	+ 0·35
·41	+ 8·64	·92	+ 5·71	·43	+ 2·93	·94	+ 0·30
·42	+ 8·58	·93	+ 5·65	·44	+ 2·88	·95	+ 0·25
·43	+ 8·52	·94	+ 5·60	·45	+ 2·82	·96	+ 0·20
·44	+ 8·46	·95	+ 5·54	·46	+ 2·77	·97	+ 0·15
·45	+ 8·40	·96	+ 5·49	·47	+ 2·72	·98	+ 0·10
·46	+ 8·34	·97	+ 5·43	·48	+ 2·67	·99	+ 0·05
·47	+ 8·29	·98	+ 5·37	·49	+ 2·61	20·00	Nil.
·48	+ 8·23	·99	+ 5·31	19·50	+ 2·56	·02	– 0·10
·49	+ 8·17	19·00	+ 5·26	·51	+ 2·51	·04	– 0·20
18·50	+ 8·11	·01	+ 5·20	·52	+ 2·46	·06	– 0·30

Meter Registering 20 Feet.		Meter Registering 20 Feet.		Meter Registering 20 Feet.		Meter Registering 30 Feet.	
Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.
Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.
20·08	– 0·40	21·10	– 5·21	22·12	– 9·59	27·00	+11·11
20·10	– 0·50	·12	– 5·30	·14	– 9·67	·02	+11·03
·12	– 0·60	·14	– 5·39	·16	– 9·75	·04	+10·95
·14	– 0·70	·16	– 5·48	·18	– 9·83	·06	+10·86
·16	– 0·79	·18	– 5·57	22·20	– 9·91	·08	+10·78
·18	– 0·89	21·20	– 5·66	·22	– 9·99	27·10	+10·70
20·20	– 0·99	·22	– 5·75	·24	–10·07	·12	+10·62
·22	– 1·09	·24	– 5·84	·26	–10·15	·14	+10·54
·24	– 1·19	·26	– 5·93	·28	–10·23	·16	+10·46
·26	– 1·28	·28	– 6·02	22·30	–10·31	·18	+10·38
·28	– 1·38	21·30	– 6·10	·32	–10·39	27·20	+10·30
20·30	– 1·48	·32	– 6·19	·34	–10·47	·22	+10·21
·32	– 1·57	·34	– 6·28	·36	–10·55	·24	+10·13
·34	– 1·67	·36	– 6·37	·38	–10·63	·26	+10·05
·36	– 1·77	·38	– 6·46	22·40	–10·71	·28	+ 9·97
·38	– 1·86	21·40	– 6·54	·42	–10·79	27·30	+ 9·89
20·40	– 1·96	·42	– 6·63	·44	–10·87	·32	+ 9·81
·42	– 2·06	·44	– 6·72	·46	–10·95	·34	+ 9·73
·44	– 2·15	·46	– 6·80	·48	–11·03	·36	+ 9·65
·46	– 2·25	·48	– 6·89	22·50	–11·11	·38	+ 9·57
·48	– 2·34	21·50	– 6·98			27·40	+ 9·49
20·50	– 2·44	·52	– 7·06			·42	+ 9·41
·52	– 2·53	·54	– 7·15			·44	+ 9·33
·54	– 2·63	·56	– 7·24			·46	+ 9·25
·56	– 2·73	·58	– 7·32			·48	+ 9·17
·58	– 2·82	21·60	– 7·41			27·50	+ 9·09
20·60	– 2·91	·62	– 7·49			·52	+ 9·01
·62	– 3·01	·64	– 7·58			·54	+ 8·93
·64	– 3·10	·66	– 7·66			·56	+ 8·85
·66	– 3·19	·68	– 7·75			·58	+ 8·78
·68	– 3·29	21·70	– 7·83			27·60	+ 8·70
20·70	– 3·38	·72	– 7·92			·62	+ 8·62
·72	– 3·47	·74	– 8·00			·64	+ 8·54
·74	– 3·57	·76	– 8·09			·66	+ 8·46
·76	– 3·66	·78	– 8·17			·68	+ 8·38
·78	– 3·75	21·80	– 8·26			27·70	+ 8·31
20·80	– 3·85	·82	– 8·34			·72	+ 8·23
·82	– 3·94	·84	– 8·42			·74	+ 8·15
·84	– 4·03	·86	– 8·51			·76	+ 8·07
·86	– 4·12	·88	– 8·59			·78	+ 7·99
·88	– 4·21	21·90	– 8·68			27·80	+ 7·92
20·90	– 4·31	·92	– 8·76			·82	+ 7·84
·92	– 4·40	·94	– 8·84			·84	+ 7·76
·94	– 4·49	·96	– 8·93			·86	+ 7·68
·96	– 4·58	·98	– 9·01			·88	+ 7·61
·98	– 4·67	22·00	– 9·09			27·90	+ 7·53
21·00	– 4·76	·02	– 9·18			·92	+ 7·45
·02	– 4·85	·04	– 9·26			·94	+ 7·38
·04	– 4·94	·06	– 9·34			·96	+ 7·30
·06	– 5·03	·08	– 9·42			·98	+ 7·22
·08	– 5·12	22·10	– 9·51			28·00	+ 7·14

Meter Registering 30 Feet.		Meter Registering 30 Feet.		Meter Registering 30 Feet.		Meter Registering 30 Feet.	
Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.
Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.
28·02	+ 7·07	29·04	+ 3·31	30·06	− 0·20	31·08	− 3·48
·04	+ 6·99	·06	+ 3·24	·08	− 0·27	31·10	− 3·54
·06	+ 6·92	·08	+ 3·16	30·10	− 0·33	·12	− 3·60
·08	+ 6·84	29·10	+ 3·09	·12	− 0·40	·14	− 3·66
28·10	+ 6·76	·12	+ 3·02	·14	− 0·47	·16	− 3·72
·12	+ 6·69	·14	+ 2·95	·16	− 0·53	·18	− 3·79
·14	+ 6·61	·16	+ 2·88	·18	− 0·60	31·20	− 3·85
·16	+ 6·53	·18	+ 2·81	30·20	− 0·66	·22	− 3·91
·18	+ 6·46	29·20	+ 2·74	·22	− 0·73	·24	− 3·97
28·20	+ 6·38	·22	+ 2·67	·24	− 0·79	·26	− 4·03
·22	+ 6·31	·24	+ 2·60	·26	− 0·86	·28	− 4·09
·24	+ 6·23	·26	+ 2·53	·28	− 0·92	31·30	− 4·16
·26	+ 6·16	·28	+ 2·46	30·30	− 0·99	·32	− 4·22
·28	+ 6·08	29·30	+ 2·39	·32	− 1·06	·34	− 4·28
28·30	+ 6·01	·32	+ 2·32	·34	− 1·12	·36	− 4·34
·32	+ 5·93	·34	+ 2·25	·36	− 1·19	·38	− 4·40
·34	+ 5·86	·36	+ 2·18	·38	− 1·26	31·40	− 4·46
·36	+ 5·78	·38	+ 2·11	30·40	− 1·32	·42	− 4·52
·38	+ 5·71	29·40	+ 2·04	·42	− 1·38	·44	− 4·58
28·40	+ 5·63	·42	+ 1·97	·44	− 1·44	·46	− 4·64
·42	+ 5·56	·44	+ 1·90	·46	− 1·51	·48	− 4·70
·44	+ 5·49	·46	+ 1·83	·48	− 1·57	31·50	− 4·76
·46	+ 5·41	·48	+ 1·76	30·50	− 1·64	·52	− 4·82
·48	+ 5·34	29·50	+ 1·69	·52	− 1·71	·54	− 4·88
28·50	+ 5·26	·52	+ 1·63	·54	− 1·77	·56	− 4·94
·52	+ 5·19	·54	+ 1·56	·56	− 1·83	·58	− 5·00
·54	+ 5·11	·56	+ 1·49	·58	− 1·89	31·60	− 5·06
·56	+ 5·04	·58	+ 1·42	30·60	− 1·96	·62	− 5·12
·58	+ 4·96	29·60	+ 1·35	·62	− 2·02	·64	− 5·18
28·60	+ 4·89	·62	+ 1·28	·64	− 2·09	·66	− 5·24
·62	+ 4·82	·64	+ 1·21	·66	− 2·15	·68	− 5·30
·64	+ 4·75	·66	+ 1·14	·68	− 2·22	31·70	− 5·36
·66	+ 4·67	·68	+ 1·08	30·70	− 2·28	·72	− 5·42
·68	+ 4·60	29·70	+ 1·01	·72	− 2·34	·74	− 5·48
28·70	+ 4·53	·72	+ 0·94	·74	− 2·40	·76	− 5·54
·72	+ 4·45	·74	+ 0·88	·76	− 2·47	·78	− 5·60
·74	+ 4·38	·76	+ 0·81	·78	− 2·53	31·80	− 5·66
·76	+ 4·31	·78	+ 0·74	30·80	− 2·60	·82	− 5·72
·78	+ 4·24	29·80	+ 0·67	·82	− 2·66	·84	− 5·78
28·80	+ 4·17	·82	+ 0·60	·84	− 2·72	·86	− 5·84
·82	+ 4·10	·84	+ 0·53	·86	− 2·78	·88	− 5·90
·84	+ 4·02	·86	+ 0·47	·88	− 2·85	31·90	− 5·96
·86	+ 3·95	·88	+ 0·40	30·90	− 2·91	·92	− 6·02
·88	+ 3·88	29·90	+ 0·33	·92	− 2·97	·94	− 6·08
28·90	+ 3·81	·92	+ 0·26	·94	− 3·04	·96	− 6·13
·92	+ 3·73	·94	+ 0·20	·96	− 3·10	·98	− 6·19
·94	+ 3·66	·96	+ 0·13	·98	− 3·16	32·00	− 6·25
·96	+ 3·59	·98	+ 0·07	31·00	− 3·22	·02	− 6·31
·98	+ 3·52	30·00	Nil.	·02	− 3·29	·04	− 6·37
29·00	+ 3·45	·02	− 0·07	·04	− 3·35	·06	− 6·42
·02	+ 3·38	·04	− 0·13	·06	− 3·42	·08	− 6·48

Meter Registering 30 Feet.		Meter Registering 30 Feet.		Meter Registering 40 Feet.		Meter Registering 40 Feet.	
Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.
Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.
32·10	− 6·54	33·12	− 9·42	36·00	+11·11	37·02	+ 8·05
·12	− 6·60	·14	− 9·47	·02	+11·05	·04	+ 7·99
·14	− 6·66	·16	− 9·53	·04	+10·99	·06	+ 7·93
·16	− 6·72	·18	− 9·59	·06	+10·92	·08	+ 7·87
·18	− 6·77	33·20	− 9·64	·08	+10·86	37·10	+ 7·82
32·20	− 6·83	·22	− 9·70	36·10	+10·80	·12	+ 7·76
·22	− 6·89	·24	− 9·75	·12	+10·74	·14	+ 7·70
·24	− 6·95	·26	− 9·81	·14	+10·68	·16	+ 7·64
·26	− 7·01	·28	− 9·86	·16	+10·62	·18	+ 7·59
·28	− 7·07	33·30	− 9·91	·18	+10·56	37·20	+ 7·53
32·30	− 7·12	·32	− 9·96	36·20	+10·50	·22	+ 7·47
·32	− 7·18	·34	−10·01	·22	+10·44	·24	+ 7·41
·34	− 7·24	·36	−10·07	·24	+10·38	·26	+ 7·36
·36	− 7·30	·38	−10·12	·26	+10·31	·28	+ 7·30
·38	− 7·36	33·40	−10·18	·28	+10·25	37·30	+ 7·24
32·40	− 7·41	·42	−10·23	36·30	+10·19	·32	+ 7·18
·42	− 7·47	·44	−10·28	·32	+10·13	·34	+ 7·13
·44	− 7·53	·46	−10·34	·34	+10·07	·36	+ 7·07
·46	− 7·59	·48	−10·39	·36	+10·01	·38	+ 7·01
·48	− 7·64	33·50	−10·45	·38	+ 9·95	37·40	+ 6·95
32·50	− 7·70	·52	−10·50	36·40	+ 9·89	·42	+ 6·90
·52	− 7·76	·54	−10·55	·42	+ 9·83	·44	+ 6·84
·54	− 7·82	·56	−10·61	·44	+ 9·77	·46	+ 6·78
·56	− 7·87	·58	−10·66	·46	+ 9·71	·48	+ 6·72
·58	− 7·93	33·60	−10·71	·48	+ 9·65	37·50	+ 6·66
32·60	− 7·98	·62	−10·76	36·50	+ 9·59	·52	+ 6·61
·62	− 8·04	·64	−10·82	·52	+ 9·53	·54	+ 6·55
·64	− 8·10	·66	−10·87	·54	+ 9·47	·56	+ 6·50
·66	− 8·15	·68	−10·93	·56	+ 9·41	·58	+ 6·44
·68	− 8·21	33·70	−10·98	·58	+ 9·35	37·60	+ 6·38
32·70	− 8·26	·72	−11·03	36·60	+ 9·29	·62	+ 6·32
·72	− 8·32	·74	−11·09	·62	+ 9·23	·64	+ 6·27
·74	− 8·37	·76	−11·14	·64	+ 9·17	·66	+ 6·21
·76	− 8·43	·78	−11·19	·66	+ 9·11	·68	+ 6·16
·78	− 8·49			·68	+ 9·05	37·70	+ 6·10
32·80	− 8·54			36·70	+ 8·99	·72	+ 6·04
·82	− 8·60			·72	+ 8·93	·74	+ 5·98
·84	− 8·66			·74	+ 8·87	·76	+ 5·93
·86	− 8·71			·76	+ 8·81	·78	+ 5·87
·88	− 8·77			·78	+ 8·76	37·80	+ 5·82
32·90	− 8·82			36·80	+ 8·70	·82	+ 5·76
·92	− 8·87			·82	+ 8·64	·84	+ 5·71
·94	− 8·93			·84	+ 8·58	·86	+ 5·65
·96	− 8·99			·86	+ 8·52	·88	+ 5·60
·98	− 9·04			·88	+ 8·46	37·90	+ 5·54
33·00	− 9·09			36·90	+ 8·40	·92	+ 5·49
·02	− 9·15			·92	+ 8·34	·94	+ 5·43
·04	− 9·20			·94	+ 8·29	·96	+ 5·37
·06	− 9·26			·96	+ 8·23	·98	+ 5·31
·08	− 9·31			·98	+ 8·17	38·00	+ 5·26
33·10	− 9·36			37·00	+ 8·11	·02	+ 5·20

Meter Registering 40 Feet.		Meter Registering 40 Feet.		Meter Registering 40 Feet.		Meter Registering 40 Feet.	
Reading of Scale of Gasholder.	**Amount of Error.**	**Reading of Scale of Gasholder.**	**Amount of Error.**	**Reading of Scale of Gasholder.**	**Amount of Error.**	**Reading of Scale of Gasholder.**	**Amount of Error.**
Feet.	**Per Cent.**	**Feet.**	**Per Cent.**	**Feet.**	**Per Cent.**	**Feet.**	**Per Cent.**
38·04	+ 5·15	39·06	+ 2·40	40·08	– 0·20	41·10	– 2·68
·06	+ 5·09	·08	+ 2·35	40·10	– 0·25	·12	– 2·72
·08	+ 5·04	39·10	+ 2·30	·12	– 0·30	·14	– 2·78
38·10	+ 4·98	·12	+ 2·25	·14	– 0·35	·16	– 2·82
·12	+ 4·93	·14	+ 2·20	·16	– 0·40	·18	– 2·87
·14	+ 4·87	·16	+ 2·15	·18	– 0·45	41·20	– 2·91
·16	+ 4·82	·18	+ 2·09	40·20	– 0·50	·22	– 2·96
·18	+ 4·76	39·20	+ 2·04	·22	– 0·55	·24	– 3·01
38·20	+ 4·71	·22	+ 1·99	·24	– 0·60	·26	– 3·06
·22	+ 4·65	·24	+ 1·94	·26	– 0·65	·28	– 3·10
·24	+ 4·60	·26	+ 1·88	·28	– 0·70	41·30	– 3·15
·26	+ 4·54	·28	+ 1·83	40·30	– 0·75	·32	– 3·19
·28	+ 4·49	39·30	+ 1·78	·32	– 0·79	·34	– 3·24
38·30	+ 4·44	·32	+ 1·73	·34	– 0·84	·36	– 3·29
·32	+ 4·38	·34	+ 1·68	·36	– 0·89	·38	– 3·34
·34	+ 4·33	·36	+ 1·63	·38	– 0·94	41·40	– 3·38
·36	+ 4·28	·38	+ 1·57	40·40	– 0·99	·42	– 3·43
·38	+ 4·22	39·40	+ 1·52	·42	– 1·04	·44	– 3·47
38·40	+ 4·17	·42	+ 1·47	·44	– 1·09	·46	– 3·52
·42	+ 4·11	·44	+ 1·42	·46	– 1·14	·48	– 3·57
·44	+ 4·06	·46	+ 1·37	·48	– 1·19	41·50	– 3·61
·46	+ 4·00	·48	+ 1·32	40·50	– 1·24	·52	– 3·66
·46	+ 3·95	39·50	+ 1·26	·52	– 1·28	·54	– 3·71
38·50	+ 3·90	·52	+ 1·21	·54	– 1·33	·56	– 3·75
·52	+ 3·84	·54	+ 1·16	·56	– 1·38	·58	– 3·80
·54	+ 3·78	·56	+ 1·11	·58	– 1·43	41·60	– 3·85
·56	+ 3·73	·58	+ 1·06	40·60	– 1·48	·62	– 3·90
·58	+ 3·68	39·60	+ 1·01	·62	– 1·53	·64	– 3·94
38·60	+ 3·63	·62	+ 0·96	·64	– 1·57	·66	– 3·99
·62	+ 3·57	·64	+ 0·91	·66	– 1·62	·68	– 4·03
·64	+ 3·52	·66	+ 0·86	·68	– 1·67	41·70	– 4·08
·66	+ 3·46	·68	+ 0·81	40·70	– 1·72	·72	– 4·12
·68	+ 3·41	39·70	+ 0·75	·72	– 1·77	·74	– 4·17
38·70	+ 3·36	·72	+ 0·70	·74	– 1·82	·76	– 4·21
·72	+ 3·31	·74	+ 0·65	·76	– 1·86	·78	– 4·26
·74	+ 3·25	·76	+ 0·60	·78	– 1·91	41·80	– 4·31
·76	+ 3·20	·78	+ 0·55	40·80	– 1·96	·82	– 4·36
·78	+ 3·14	39·80	+ 0·50	·82	– 2·01	·84	– 4·40
38·80	+ 3·09	·82	+ 0·45	·84	– 2·06	·86	– 4·45
·82	+ 3·04	·84	+ 0·40	·86	– 2·10	·88	– 4·49
·84	+ 2·99	·86	+ 0·35	·88	– 2·15	41·90	– 4·54
·86	+ 2·93	·88	+ 0·30	40·90	– 2·20	·92	– 4·58
·88	+ 2·88	39·90	+ 0·25	·92	– 2·25	·94	– 4·63
38·90	+ 2·82	·92	+ 0·20	·94	– 2·30	·96	– 4·67
·92	+ 2·77	·94	+ 0·15	·96	– 2·34	·98	– 4·72
·94	+ 2·72	·96	+ 0·10	·98	– 2·39	42·00	– 4·76
·96	+ 2·67	·98	+ 0·05	41·00	– 2·44	·02	– 4·81
·98	+ 2·61	40·00	Nil.	·02	– 2·49	·04	– 4·85
39·00	+ 2·56	·02	– 0·05	·04	– 2·53	·06	– 4·90
·02	+ 2·51	·04	– 0·10	·06	– 2·58	·08	– 4·94
·04	+ 2·46	·06	– 0·15	·08	– 2·63	42·10	– 4·99

Meter Registering 40 Feet.		Meter Registering 40 Feet.		Meter Registering 40 Feet.		Meter Registering 50 Feet.	
Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.
Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.
42·12	− 5·03	43·14	− 7·28	44·16	− 9·42	45·00	+11·11
·14	− 5·08	·16	− 7·32	·18	− 9·47	·02	+11·06
·16	− 5·12	·18	− 7·37	44·20	− 9·51	·04	+11·01
·18	− 5·17	43·20	− 7·41	·22	− 9·55	·06	+10·96
42·20	− 5·21	·22	− 7·45	·24	− 9·59	·08	+10·91
·22	− 5·26	·24	− 7·49	·26	− 9·63	45·10	+10·86
·24	− 5·30	·26	− 7·54	·28	− 9·67	·12	+10·81
·26	− 5·35	·28	− 7·58	44·30	− 9·71	·14	+10·76
·28	− 5·39	43·30	− 7·62	·32	− 9·75	·16	+10·72
42·30	− 5·44	·32	− 7·66	·34	− 9·79	·18	+10·67
·32	− 5·48	·34	− 7·71	·36	− 9·83	45·20	+10·62
·34	− 5·53	·36	− 7·75	·38	− 9·87	·22	+10·57
·36	− 5·57	·38	− 7·79	44·40	− 9·91	·24	+10·52
·38	− 5·62	43·40	− 7·83	·42	− 9·95	·26	+10·48
42·40	− 5·66	·42	− 7·88	·44	− 9·99	·28	+10·43
·42	− 5·71	·44	− 7·92	·46	−10·03	45·30	+10·38
·44	− 5·75	·46	− 7·96	·48	−10·07	·32	+10·33
·46	− 5·80	·48	− 8·00	44·50	−10·11	·34	+10·28
·48	− 5·84	43·50	− 8·05	·52	−10·15	·36	+10·23
42·50	− 5·88	·52	− 8·09	·54	−10·19	·38	+10·18
·52	− 5·93	·54	− 8·13	·56	−10·23	45·40	+10·13
·54	− 5·98	·56	− 8·17	·58	−10·27	·42	+10·08
·56	− 6·02	·58	− 8·22	44·60	−10·31	·44	+10·03
·58	− 6·06	43·60	− 8·26	·62	−10·35	·46	+ 9·99
42·60	− 6·10	·62	− 8·30	·64	−10·39	·48	+ 9·94
·62	− 6·15	·64	− 8·34	·66	−10·43	45·50	+ 9·89
·64	− 6·19	·66	− 8·38	·68	−10·47	·52	+ 9·84
·66	− 6·24	·68	− 8·42	44·70	−10·51	·54	+ 9·79
·68	− 6·28	43·70	− 8·47	·72	−10·55	·56	+ 9·75
42·70	− 6·33	·72	− 8·51	·74	−10·59	·58	+ 9·70
·72	− 6·37	·74	− 8·55	·76	−10·63	45·60	+ 9·65
·74	− 6·41	·76	− 8·59	·78	−10·67	·62	+ 9·60
·76	− 6·45	·78	− 8·64	44·80	−10·71	·64	+ 9·55
·78	− 6·50	43·80	− 8·68	·82	−10·75	·66	+ 9·50
42·80	− 6·54	·82	− 8·72	·84	−10·79	·68	+ 9·46
·82	− 6·59	·84	− 8·76	·86	−10·84	45·70	+ 9·41
·84	− 6·63	·86	− 8·80	·88	−10·87	·72	+ 9·36
·46	− 6·68	·88	− 8·84	44·90	−10·91	·74	+ 9·31
·88	− 6·72	43·90	− 8·89	·92	−10·95	·76	+ 9·27
42·90	− 6·76	·92	− 8·93	·94	−10·99	·78	+ 9·22
·92	− 6·80	·94	− 8·97	·96	−11·03	45·80	+ 9·17
·94	− 6·85	·96	− 9·01	·98	−11·07	·82	+ 9·12
·96	− 6·89	·98	− 9·05	45·00	−11·11	·84	+ 8·07
·98	− 6·94	44·00	− 9·09			·86	+ 9·03
43·00	− 6·98	·02	− 9·14			·88	+ 8·98
·02	− 7·02	·04	− 9·18			45·90	+ 8·93
·04	− 7·06	·06	− 9·22			·92	+ 8·88
·06	− 7·11	·08	− 9·26			·94	+ 8·84
·08	− 7·15	44·10	− 9·30			·96	+ 8·79
43·10	− 7·20	·12	− 9·34			·98	+ 8·75
·12	− 7·24	·14	− 9·38			46·00	+ 8·70

Meter Registering 50 Feet.		Meter Registering 50 Feet.		Meter Registering 50 Feet.		Meter Registering 50 Feet.	
Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.	Reading of Scale of Gasholder.	Amount of Error.
Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.	Feet.	Per Cent.
46·02	+ 8·65	47·04	+ 6·29	48·06	+ 4·04	49·08	+ 1·87
·04	+ 8·60	·06	+ 6·25	·08	+ 3·99	49·10	+ 1·83
·06	+ 8·56	·08	+ 6·20	48·10	+ 3·95	·12	+ 1·79
·08	+ 8·51	47·10	+ 6·16	·12	+ 3·91	·14	+ 1·75
46·10	+ 8·46	·12	+ 6·11	·14	+ 3·86	·16	+ 1·71
·12	+ 8·41	·14	+ 6·07	·16	+ 3·82	·18	+ 1·67
·14	+ 8·37	·16	+ 6·02	·18	+ 3·77	49·20	+ 1·63
·16	+ 8·32	·18	+ 5·98	48·20	+ 3·73	·22	+ 1·59
·18	+ 8·28	47·20	+ 5·93	·22	+ 3·69	·24	+ 1·55
46·20	+ 8·23	·22	+ 5·89	·24	+ 3·65	·26	+ 1·50
·22	+ 8·18	·24	+ 5·84	·26	+ 3·60	·28	+ 1·46
·24	+ 8·13	·26	+ 5·80	·28	+ 3·56	49·30	+ 1·42
·26	+ 8·09	·28	+ 5·75	48·30	+ 3·52	·32	+ 1·38
·28	+ 8·04	47·30	+ 5·71	·32	+ 3·48	·34	+ 1·34
46·30	+ 7·99	·32	+ 5·67	·34	+ 3·44	·36	+ 1·29
·32	+ 7·94	·34	+ 5·62	·36	+ 3·39	·38	+ 1·25
·34	+ 7·90	·36	+ 5·58	·38	+ 3·35	49·40	+ 1·21
·36	+ 7·85	·38	+ 5·53	48·40	+ 3·31	·42	+ 1·17
·38	+ 7·81	47·40	+ 5·49	·42	+ 3·27	·44	+ 1·13
46·40	+ 7·76	·42	+ 5·44	·44	+ 3·22	·46	+ 1·09
·42	+ 7·71	·44	+ 5·40	·46	+ 3·18	·48	+ 1·05
·44	+ 7·67	·46	+ 5·35	·48	+ 3·13	49·50	+ 1·01
·46	+ 7·62	·48	+ 5·31	48·50	+ 3·09	·52	+ 0·97
·48	+ 7·58	47·50	+ 5·26	·52	+ 3·05	·54	+ 0·93
46·50	+ 7·53	·52	+ 5·22	·54	+ 3·01	·56	+ 0·89
·52	+ 7·48	·54	+ 5·17	·56	+ 2·96	·58	+ 0·85
·54	+ 7·44	·56	+ 5·13	·58	+ 2·92	49·60	+ 0·81
·56	+ 7·39	·58	+ 5·08	48·60	+ 2·88	·62	+ 0·77
·58	+ 7·35	47·60	+ 5·04	·62	+ 2·84	·64	+ 0·73
46·60	+ 7·30	·62	+ 5·00	·64	+ 2·80	·66	+ 0·68
·62	+ 7·25	·64	+ 4·95	·66	+ 2·75	·68	+ 0·64
·64	+ 7·21	·66	+ 4·91	·68	+ 2·71	49·70	+ 0·60
·66	+ 7·16	·68	+ 4·86	48·70	+ 2·67	·72	+ 0·56
·68	+ 7·12	47·70	+ 4·82	·72	+ 2·63	·74	+ 0·52
46·70	+ 7·07	·72	+ 4·78	·74	+ 2·59	·76	+ 0·48
·72	+ 7·02	·74	+ 4·73	·76	+ 2·54	·78	+ 0·44
·74	+ 6·98	·76	+ 4·69	·78	+ 2·50	49·80	+ 0·40
·76	+ 6·93	·78	+ 4·64	48·80	+ 2·46	·82	+ 0·36
·78	+ 6·89	47·80	+ 4·60	·82	+ 2·42	·84	+ 0·32
46·80	+ 6·84	·82	+ 4·56	·84	+ 2·38	·86	+ 0·28
·82	+ 6·79	·84	+ 4·51	·86	+ 2·33	·88	+ 0·24
·84	+ 6·75	·86	+ 4·47	·88	+ 2·29	49·90	+ 0·20
·86	+ 6·70	·88	+ 4·42	48·90	+ 2·25	·92	+ 0·16
·88	+ 6·66	47·90	+ 4·38	·92	+ 2·21	·94	+ 0·12
46·90	+ 6·61	·92	+ 4·34	·94	+ 2·17	·96	+ 0·08
·92	+ 6·56	·94	+ 4·30	·96	+ 2·12	·98	+ 0·04
·94	+ 6·52	·96	+ 4·25	·98	+ 2·08	50·00	Nil.
·96	+ 6·47	·98	+ 4·21	49·00	+ 2·04	·02	– 0·04
·98	+ 6·43	48·00	+ 4·17	·02	+ 2·00	·04	– 0·08
47·00	+ 6·38	·02	+ 4·13	·04	+ 1·96	·06	– 0·12
·02	+ 6·34	·04	+ 4·08	·06	+ 1·91	·08	– 0·16

NOMENCLATURE.

The compounds of the non-metallic elements with the metals and with each other have names ending in "ide" or "uret;" as $Fe\ S$ sulphide or sulphuret of iron.

When two or more equivalents of the non-metallic elements enter into combination, the number of equivalents is expressed by prefixes.

Bi means 2 eq., as $N\ O_2$ binoxide of nitrogen.
Ter „ 3 eq., as $Sb_2\ S_3$ tersulphide of antimony.
Penta „ 5 eq.
Sesqui „ 1½ eq. (= 2 to 3), as $Fe_2\ O_3$ sesquioxide of iron.
Proto „ first, or 1 to 1, as $Fe\ O$ protoxide of iron.
Sub „ under, as $Cu_2\ O$ suboxide of copper.
Per „ the highest, as $Cl\ O_4$ peroxide of chlorine.

Alkalies neutralize acids, forming salts.

The terminations "ic" and "ous" are used for acids, the former representing a higher state of oxidation than the latter.

When a substance forms more than two acid compounds, the prefixes "hypo," *under*, and "hyper," *above*, are used.

A base is a compound which will chemically combine with an acid.

A salt is a compound of an acid and a base.

When water is in combination with acids or bases, they are said to be hydrated.

LIST OF SOME BINARY COMPOUNDS.

Name of Compound.	Symbol.	Name of Compound.	Symbol.
Ammonia	$N\ H_3$	Olefiant gas	$C_2\ H_4$
Bisulphide of carbon	$C\ S_2$	Peroxide of iron	$Fe_2\ O_3$
Carbonic acid gas	$C\ O_2$	Protoxide of iron	$Fe\ O$
Carbonic oxide	$C\ O$	Sulphurous acid gas.	$S\ O_2$
Cyanogen	$N\ C_2$	Sulphuric acid	H_2SO_4
Hydrochloric acid	$H\ Cl$	Sulphuretted hydrogen	$H_2\ S$
Light carburetted hydrogen	$C\ H_4$	Water	$H_2\ O$
Nitric acid	$N\ O_5$		

COMMON NAMES OF CERTAIN CHEMICAL SUBSTANCES.

Aqua fortis	Nitric acid.
Bluestone, or blue vitriol	Sulphate of copper.
Calomel	Chloride of mercury.
Chloroform	Chloride of formyle.
Common salt	Chloride of sodium.
Copperas, or green vitriol	Sulphate of iron.
Corrosive sublimate	Bichloride of mercury.
Dry alum	Sulphate of alumina and potash.
Epsom salts	Sulphate of magnesia.
Ethiops mineral	Black sulphide of mercury.
Galena	Sulphide of lead.
Glauber's salts	Sulphate of soda.
Iron pyrites	Bisulphide of iron.
Jeweller's putty	Oxide of tin.
King's yellow	Sulphide of arsenic.
Laughing gas	Protoxide of nitrogen.
Lime	Oxide of calcium.
Lunar caustic	Nitrate of silver.

Mosaic gold	Bisulphide of tin.
Nitre, or saltpetre	Nitrate of potash.
Oil of vitriol	Sulphuric acid.
Realgar	Sulphide of arsenic.
Red lead	Oxide of lead.
Rust of iron	Oxide of iron.
Soda	Oxide of sodium.
Spirit of hartshorn	Ammonia.
Spirit of salt	Hydrochloric acid.
Stucco, or plaster of Paris	Sulphate of lime.
Sugar of lead	Acetate of lead.
Vermilion	Sulphide of mercury.
Vinegar	Acetic acid.
Volatile alkali	Ammonia.
Water	Oxide of hydrogen.
White vitriol	Sulphate of zinc.

TABLE

Showing the Number of Volumes of Various Gases which 100 *Volumes of Water, at* 60° *Fahr. and* 30 *Inches Barometric Pressure, can Absorb.* (*Dr. Frankland.*)

Ammonia	7800 volumes.
Sulphurous acid	3300 „
Sulphuretted hydrogen	253 „
Carbonic acid	100 „
Olefiant gas	12·5 „
Illuminating hydrocarbons	Not determined, but probably more soluble than olefiant gas.
Oxygen	3·7 volumes.
Carbonic oxide	1·56 „
Nitrogen	1·56 „
Hydrogen	1·56 „
Light carburetted hydrogen	1·60 „

When water has been saturated with one gas and is exposed to the influence of a second, it usually allows a portion of the first to escape whilst it absorbs an equivalent quantity of the second. In this way a small portion of a not easily soluble gas can expel a large volume of an easily soluble one.

TABLE

Exhibiting the Proportions by Volume of Aqueous Vapour existing in any Gas Standing in Contact with Water, at the corresponding Temperature, and at the Mean Barometric Pressure of 30 *Inches.* (*Dalton and Ure.*)

Temperature. Deg.	Volume of Aqueous Vapour.	Temperature. Deg.	Volume of Aqueous Vapour.	Temperature. Deg.	Volume of Aqueous Vapour.
40	·00933	54	·01533	68	·02406
41	·00973	55	·01586	69	·02483
42	·01013	56	·01640	70	·02566
43	·01053	57	·01693	71	·02653
44	·01093	58	·01753	72	·02740
45	·01133	59	·01810	73	·02830
46	·01173	60	·01866	74	·02923
47	·01213	61	·01923	75	·03020
48	·01253	62	·01980	76	·03120
49	·01293	63	·02050	77	·03220
50	·01333	64	·02120	78	·03323
51	·01380	65	·02190	79	·03423
52	·01426	66	·02260	80	·03533
53	·01480	67	·02330		

AIR REQUIRED IN BURNING A TON OF COAL.

It requires ten tons of air (including two tons of oxygen) to burn one ton of coal.

THE INSOLUBILITY OF LEAD IN SULPHURIC ACID

Occasions its being employed as the material for constructing the chambers in which that acid is used or prepared.

COLOURED WATER FOR PRESSURE-GAUGES

Is made by infusing a little pounded cochineal in hot water. It is then filtered, and a few drops of nitric or hydrochloric acid added, to prevent the bright scarlet colour from fading.

The glass tubes of pressure-gauges, when foul, may be cleaned with a weak solution of sulphuric acid in water.

TABLE

Showing the Relative Power of Metals for Conducting Heat.

Gold	1000	Iron	374·3
Silver	973	Zinc	363
Copper	898·2	Tin	303·9
Platinum	381	Lead	179·6

TABLE

Showing the Lineal Expansion of Metals produced by Raising their Temperature from 32° to 212° Fahr.

Zinc	1 part in	322	Gold	1 part in	682
Platinum	,,	351	Bismuth	,,	719
Tin (pure)	,,	403	Iron	,,	812
Tin (impure)	,,	500	Antimony	,,	923
Silver	,,	524	Palladium	,,	1000
Copper	,,	581	Platinum	,,	1100
Brass	,,	584	Flint glass	,,	1248

Expansion of Liquids in Volume from 32° to 212° Fahr.

1000 parts of	water	become	1046
,,	oil	,,	1080
,,	mercury	,,	1018
,,	spirits of wine	,,	1110
,,	air	,,	1373

TO SOFTEN OLD HARD LEATHER.

Rub it with the best lard; this is better than curriers' dubbin, especially when it is inconvenient to bring the leather near a fire during the rubbing process. Lard soaks into the leather, and makes it feel soft and kindly without heat. Dubbin has to be rubbed in opposite to a fire.

GAS LIME:

Its Composition, and Use in Agriculture.

In a valuable paper on gas lime published in the *Journal of Gas Lighting*,* Professor Voelcker states that a copious supply of air is necessary to transform the injurious sulphur compounds contained in the material into fertilizing agents.

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* Vol. xiv., p. 210.

When exposed to the air (and the longer it is kept exposed the better), gas lime is in some respects superior to quicklime as a manure.

The oxygen of the atmosphere destroys the offensive smell, and changes the sulphuret of calcium in it—first into sulphite, and finally into sulphate of lime or gypsum, well known as a valuable fertilizing substance.

In addition to its chemical virtues, gas lime exercises a beneficial *mechanical* effect upon land, by rendering stiff, heavy, clayey land more porous and friable, and by consolidating light sandy soils.

The crops which are particularly benefited by gas lime are—clover, sainfoin, lucerne, peas, beans, vetches, and turnips. It is a useful fertilizer for permanent pasture, destroying the coarser grasses, and favouring the growth of a sweeter and more nutritious herbage.

It kills moss, heath, feather grass, and other plants characteristic of peaty land, its application to which cannot be too strongly recommended.

As a general rule, two tons per acre is the quantity of gas lime which ought to be put on land.

The proper time for its application is in autumn or winter.

During the period of storeage, the heap should be turned over once or twice to ensure its complete exposure to the air.

The following is an analysis by Professor Voelcker of a sample of gas lime, *kept long enough to be used with safety as a manure.*

Composition of Gas Lime (Dried at 212° *Fahr.).*

	Per Cent.
Water of combination and a little organic matter	7·24
Oxides of iron and alumina, with traces of phosphoric acid .	2·49
Sulphate of lime (gypsum)	4·64
Sulphite of lime.	15·19
Carbonate of lime	49·40
Caustic lime	18·23
Magnesia and alkalies.	2·53
Insoluble siliceous matter	0·28
	100·00

In fresh gas lime the proportion of water varies usually from 30 to 40 per cent.

TABLE

Showing the Results obtained by the Application of Certain Manures to Land.
(Mr. Wilson, of Largs.)

Manure.	Produce of the Lot in lbs.	Pounds of Hay per Acre.	Increase per Acre over that Untouched.
Left untouched	420	3360	
2½ barrels of quicklime	602	4816	1456
1 ton of lime from gas-works	651	5208	1848
4½ cwt. of wood charcoal powder	665	5320	1960
2 bushels of bone dust	693	5544	2184
18 lbs. of nitrate of potash	742	5936	2576
20 lbs. of nitrate of soda.	784	6272	2912
10 bushels of soot	819	6552	3192
28 lbs. of sulphate of ammonia	874	6776	3416
100 gals. of ammoniacal liquor from gas-works	945	7562	4202

The land was a piece of three years' old pasture, of uniform quality, divided into ten lots of 20 perches each. All the lots were manured at the same time with the articles given in the table, and the grass cut and made into hay in July. Each application cost the same.

Ammoniacal liquor is best applied at the following strength :—

Ammoniacal liquor	1 part.
Water	7 parts.

The proper time for its application is in the spring, after the grass has commenced growing, and during cloudy weather. It may be sprinkled on the land as water is applied to the streets of towns to lay the dust.

AMMONIACAL WATER.

The strength and consequent value of ammoniacal water is ascertained by Twaddel's hydrometer, and also by the quantity of sulphuric acid of the specific gravity 1845° required to neutralize it.

Each degree of Twaddel is equal, as nearly as possible, to 2 ounces of acid per gallon of the liquor; hence arises the description of its value :—

Water of 5 degrees Twaddel is called 10-ounce liquor.
„ 6 „ „ 12 „
„ 7 „ „ 14 „

And so on, at the rate of 2 ounces for each degree.

Sulphate of Ammonia.

The product of ammoniacal water, when treated with sulphuric acid, is sulphate of ammonia.

A ton of coal yields liquor sufficient to produce from 20 lbs. to 30 lbs. of sulphate of ammonia, varying according to the class of coal, and the efficiency of the process for obtaining the salt.

Muriate of Ammonia.

The product obtained from ammoniacal water, when treated with muriatic or hydrochloric acid, is muriate of ammonia.

COAL TAR.

The specific gravity of coal tar ranges from 1120 to 1150.

SPERMACETI

Is a crystalline substance given from whale oil.

TWADDEL'S HYDROMETER.

To convert degrees of Twaddel's hydrometer into specific gravity, multiply the number of degrees by 5, and add 1000 to the product.

Example.—Twaddel $6 \times 5 + 1000 = 1030$ specific gravity.

To convert specific gravity into degrees of Twaddel, deduct 1000 from the specific gravity, and divide the remainder by 5.

Example.—Specific gravity $1030 - 1000 \div 5 = 6$ degrees of Twaddel.

EPITOME OF MENSURATION.

Of the Circle, Cylinder, and Sphere.

The areas of circles are to each other as the squares of their diameters.
The diameter of a circle being 1, its circumference equals 3·1416.
The diameter of a circle is equal to ·31831 of its circumference.
The square of the diameter of a circle being 1, its area equals ·7854.

The internal circumference of a cylinder multiplied by its length or height equals its concave surface.

The area of the end of a cylinder multiplied by its length equals its solid contents.

The area of the internal diameter of a cylinder multiplied by its depth equals its cubical capacity.

The square of the diameter of a sphere multiplied by 3·1416 equals its convex surface.

The cube of the diameter of a sphere multiplied by ·5236 equals its solid contents.

The capacity of a cylinder 1 foot in diameter and 1 foot in length equals 4·895 imperial gallons.

The capacity of a cylinder 1 inch in diameter and 1 foot in length equals ·034 of an imperial gallon.

The capacity of a cylinder 1 inch in diameter and 1 inch in length equals ·002832 of an imperial gallon. Hence—

The capacity of any other cylinder in imperial gallons is obtained by multiplying the square of its diameter by its length, and by the number of imperial gallons contained in the unity of its measurement.

The capacity of a sphere 1 foot in diameter equals 3·263 imperial gallons.

The capacity of a sphere 1 inch in diameter equals ·001888 of an imperial gallon. Hence—

The capacity of any other sphere in imperial gallons is obtained by multiplying the cube of its diameter by the number of imperial gallons contained in the unity of its measurement.

Of the Square, Rectangle, and Cube.

The side of a square equals the square root of its area.

The area of a square equals the square of one of its sides.

The diagonal of a square equals the square root of twice the square of its side.

The side of a square is equal to the square root of half the square of its diagonal.

The side of a square equal to the diagonal of a given square contains double the area of the given square.

The area of a rectangle equals its length multiplied by its breadth.

The length of a rectangle equals the area divided by the breadth; or the breadth equals the area divided by the length.

The side or end of a rectangle equals the square root of the sum of the diagonal and opposite side to that required, multiplied by their difference.

The diagonal in a rectangle equals the square root of the sum of the squares of the base and perpendicular.

The solidity of a cube equals the area of one of its sides multiplied by the length or breadth of one of its sides.

The length or breadth of a side of a cube equals the cube root of its solidity.

The capacity of a 12-inch cube equals 6·232 imperial gallons.

Of Triangles and Polygons.

The sum of the squares of the two given sides of a right-angled triangle is equal to the square of the hypotenuse.

The difference between the squares of the hypotenuse and given side of a right-angled triangle is equal to the square of the required side.

The area of a triangle equals half the product of the base multiplied by the perpendicular height.

The side of any regular polygon multiplied by its apothem, or perpendicular, and by the number of its sides, equals twice the area.

Of Ellipses, Cones, and Frustums.

The square root of half the sum of the squares of the two diameters of an ellipse, multiplied by 3·1416, equals its circumference.

The product of the two axes of an ellipse, multiplied by ·7854, equals its area.

The solidity of a cone equals one-third of the product of its base multiplied by its altitude, or height.

The squares of the diameters of the two ends of the frustum of a cone added to the product of the two diameters, and that sum multiplied by its height and by ·2618, equals its solidity.

TABLE OF SQUARES, CUBES, SQUARE ROOTS, CUBE ROOTS, AND RECIPROCALS OF NUMBERS.

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
1	1	1	1·0000000	1·0000000	·100000000
2	4	8	1·4142136	1·2599210	·500000000
3	9	27	1·7320508	1·4422496	·333333333
4	16	64	2·0000000	1·5874011	·250000000
5	25	125	2·2360680	1·7099759	·200000000
6	36	216	2·4494897	1·8171206	·166666667
7	49	343	2·6457513	1·9129312	·142857143
8	64	512	2·8284271	2·0000000	·125000000
9	81	729	3·0000000	2·0800837	·111111111
10	100	1000	3·1622777	2·1544347	·100000000
11	121	1331	3·3166248	2·2239801	·090909091
12	144	1728	3·4641016	2·2894286	·083333333
13	169	2197	3·6055513	2·3513347	·076923077
14	196	2744	3·7416574	2·4101422	·071428571
15	225	3375	3·8729833	2·4662121	·066666667
16	256	4096	4·0000000	2·5198421	·062500000
17	289	4913	4·1231056	2·5712816	·058823529
18	324	5832	4·2426407	2·6207414	·055555556
19	361	6859	4·3588989	2·6684016	·052631579
20	400	8000	4·4721360	2·7144177	·050000000
21	441	9261	4·5825757	2·7589243	·047619048
22	484	10648	4·6904158	2·8020393	·045454545
23	529	12167	4·7558315	2·8438670	·043478261
24	576	13824	4·8989795	2·8844991	·041666667
25	625	15625	5·0000000	2·9240177	·040000000
26	676	17576	5·0990195	2·9624960	·038461538
27	729	19683	5·1961524	3·0000000	·037037037
28	784	21952	5·2915026	3·0365889	·035714286
29	841	24389	5·3851648	3·0723168	·034482759
30	900	27000	5·4772256	3·1072325	·033333333
31	961	29791	5·5677644	3·1413806	·032258065
32	1024	32768	5·6568542	3·1748021	·031250000
33	1089	35937	5·7445626	3·2075343	·030303030
34	1156	39304	5·8309519	3·2396118	·029411765
35	1225	42875	5·9160798	3·2710663	·028571429
36	1296	46656	6·0000000	3·3019272	·027777778
37	1369	50653	6·0827625	3·3322218	·027027027
38	1444	54872	6·1644140	3·3619754	·026315789
39	1521	59319	6·2449980	3·3912114	·025641026
40	1600	64000	6·3245553	3·4199519	·025000000
41	1681	68921	6·4031242	3·4482172	·024390244
42	1764	74088	6·4807407	3·4760266	·023809524
43	1849	79507	6·5574385	3·5033981	·023255814
44	1936	85184	6·6332496	3·5303483	·022727273
45	2025	91125	6·7082039	3·5568933	·022222222
46	2116	97336	6·7823300	3·5830479	·021739130
47	2209	103823	6·8556546	3·6088261	·021276600
48	2304	110592	6·9282032	3·6342411	·020833333
49	2401	117649	7·0000000	3·6593057	·020408163
50	2500	125000	7·0710678	3·6840314	·020000000
51	2601	132651	7·1414284	3·7084298	·019607843
52	2704	140608	7·2111026	3·7325111	·019230769
53	2809	148877	7·2801099	3·7562858	·018867925
54	2916	157464	7·3484692	3·7797631	·018518519
55	3025	166375	7·4161985	3·8029525	·018181818
56	3136	175616	7·4833148	3·8258624	·017857143
57	3249	185193	7·5498344	3·8485011	·017543860

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
58	3364	195112	7·6157731	3·8708766	·017241379
59	3481	205379	7·6811457	3·8929965	·016949153
60	3600	216000	7·7459667	3 9148676	·016666667
61	3721	226981	7·8102497	3·9304972	·016393443
62	3844	238328	7·8740079	3·9578915	·016129032
63	3969	250047	7·9372539	3·9790571	·015873016
64	4096	262144	8·0000000	4·0000000	·015625000
65	4225	274625	8·0622577	4·0207256	·015384615
66	4356	287496	8·1240384	4·0412401	·015151515
67	4489	300763	8·1853528	4 0615480	·014925373
68	4624	314432	8·2462113	4·0816551	·014705882
69	4761	328509	8 3066239	4·1015661	·014492754
70	4900	343000	8 3666003	4·1212853	·014285714
71	5041	357911	8·4261498	4·1408178	·014084517
72	5184	373248	8·4852814	4·1601676	·013888889
73	5329	389017	8·5440037	4·1793390	·013698630
74	5476	405224	8·6023253	4·1983364	·013513514
75	5625	421875	8·6602540	4·2171633	·013333333
76	5776	438976	8·7177979	4·2358236	·013157895
77	5929	456533	8·7749644	4·2543210	·012987013
78	6084	474552	8·8317609	4·2726586	·012820513
79	6241	493039	8·8881944	4·2908404	·012658228
80	6400	512000	8·9442719	4·3088695	·012500000
81	6561	531441	9·0000000	4·3267487	·012345679
82	6724	551368	9·0553851	4·3444815	·012195122
83	6889	571787	9·1104336	4·3620707	·012048193
84	7056	592704	9·1651514	4·3795191	·011904762
85	7225	614125	9·2195445	4·3968296	·011764706
86	7396	636056	9·2736185	4·4140049	·011627907
87	7569	658503	9·3273791	4·4310476	·011494253
88	7744	681472	9·3808315	4·4470692	·011363636
89	7921	704969	9·4339811	4·4647451	·011235955
90	8100	729000	9·4868330	4·4814047	·011111111
91	8281	753571	9·5393920	4·4979414	·010989011
92	8464	778688	9·5916630	4·5143574	·010869565
93	8649	804357	9·6436508	4·5306549	·010752688
94	8836	830584	9·6953597	4·5468359	·010638298
95	9025	857375	9·7467943	4·5629026	·010526316
96	9216	884736	9·7979590	4·5788570	·010416667
97	9409	912673	9·8488578	4·5947009	·010309278
98	9604	941192	9·8994949	4·6104363	·010204082
99	9801	970299	9·9498744	4·6260650	·010101010
100	10000	1000000	10·0000000	4·6415888	·010000000
101	10201	1030301	10·0498756	4·6570095	·009900990
102	10404	1061208	10·0995049	4·6723287	·009803922
103	10609	1092727	10·1488916	4·6875482	·009708738
104	10816	1124864	10·1980390	4·7026694	·009615385
105	11025	1157625	10·2469508	4·7176940	·009523810
106	11236	1191016	10·2956301	4·7326235	·009433962
107	11449	1225043	10·3440804	4·7474594	·009345794
108	11664	1259712	10·3923048	4·7622032	·009259259
109	11881	1295029	10·4403065	4·7768562	·009174312
110	12100	1331000	10·4880885	4·7914199	·009090909
111	12321	1367631	10·5356538	4·8058995	·009009009
112	12544	1404928	10·5830052	4·8202845	·008928571
113	12769	1442897	10·6301458	4·8345881	·008849558
114	12996	1481544	10·6770783	4·8488076	·008771930
115	13225	1520875	10·7238053	4·8629442	·008695652
116	13456	1560896	10·7703296	4·8769990	·008020690
117	13689	1601613	10·8166538	4·8909732	·008547009

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
118	13924	1643032	10·8627805	4·9048681	·008474576
119	14161	1685159	10·9087121	4·9186847	·008403361
120	14400	1728000	10·9544512	4·9324242	·008333333
121	14641	1771561	11·0000000	4·9460874	·008264463
122	14884	1815848	11·0453610	4·9596757	·008196721
123	15129	1860867	11·0905365	4·9731898	·008130081
124	15376	1906624	11·1355287	4·9866310	·008064516
125	15625	1953125	11·1803399	5·0000000	·008000000
126	15876	2000376	11·2249722	5·0132979	·007936508
127	16129	2048383	11·2694277	5·0265257	·007874016
128	16384	2097152	11·3137085	5·0396842	·007812500
129	16641	2146689	11·3578167	5·0527743	·007751938
130	16900	2197000	11·4017543	5·0657970	·007692308
131	17161	2248091	11·4455231	5·0787531	·007633588
132	17424	2299968	11·4891253	5·0916434	·007575758
133	17689	2352637	11·5325626	5·1044687	·007518797
134	17956	2406104	11·5758369	5·1172299	·007462687
135	18225	2460375	11·6189500	5·1299278	·007407407
136	18496	2515456	11·6619038	5·1425632	·007352941
137	18769	2571353	11·7046999	5·1551367	·007299270
138	19044	2628072	11·7473444	5·1676493	·007246377
139	19321	2685619	11·7898261	5·1801015	·007194245
140	19600	2744000	11·8321596	5·1924941	·007142857
141	19881	2803221	11·8743421	5·2048279	·007092199
142	20164	2863288	11·9163753	5·2171034	·007042254
143	20449	2924207	11·9582607	5·2293215	·006993007
144	20736	2985984	12·0000000	5·2414828	·006944444
145	21025	3048625	12·0415946	5·2535879	·006896552
146	21316	3112136	12·0830460	5·2656374	·006849315
147	21609	3176523	12·1243557	5·2776321	·006802721
148	21904	3241792	12·1655251	5·2895725	·006756757
149	22201	3307949	12·2065556	5·3014592	·006711409
150	22500	3375000	12·2474487	5·3132928	·006666667
151	22801	3442951	12·2882057	5·3250740	·006622517
152	23104	3511808	12·3288280	5·3368033	·006578947
153	23409	3581577	12·3693169	5·3484812	·006535948
154	23716	3652264	12·4096736	5·3601084	·006493506
155	24025	3723875	12·4498996	5·3716854	·006451613
156	24336	3796416	12·4899960	5·3832126	·006410256
157	24649	3869893	12·5299641	5·3946907	·006369427
158	24964	3944312	12·5698051	5·4061202	·006329114
159	25281	4019679	12·6095202	5·4175015	·006289308
160	25600	4096000	12·6491106	5·4288352	·006250000
161	25921	4173281	12·6885775	5·4401218	·006211180
162	26244	4251528	12·7279221	5·4513618	·006172840
163	26569	4330747	12·7671453	5·4625556	·006134969
164	26896	4410944	12·8062485	5·4737037	·006097561
165	27225	4492125	12·8452326	5·4848066	·006060606
166	27556	4574296	12·8840987	5·4958647	·006024096
167	27889	4657463	12·9228480	5·5068784	·005988024
168	28224	4741632	12·9614814	5·5178484	·005952381
169	28561	4826809	13·0000000	5·5287748	·005917160
170	28900	4913000	13·9384048	5·5396583	·005882353
171	29241	5000211	13·0766968	5·5504991	·005847953
172	29584	5088448	13·1148770	5·5612978	·005813953
173	29929	5177717	13·1529464	5·5720546	·005780347
174	30276	5268024	13·1909060	5·5827702	·005747126
175	30625	5359375	13·2287566	5·5934447	·005714286
176	30976	5451776	13·2664992	5·6040787	·005681818
177	31329	5545233	13·3041347	5·6146724	·005649718

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
178	31684	5639752	13·3416641	5·6252263	·005617978
179	32041	5735339	13·3790882	5·6357408	·005586592
180	32400	5832000	13·4164079	5·6462162	·005555556
181	32761	5929741	13·4536240	5·6566528	·005524862
182	33124	6028568	13·4907376	5·6670511	·005494505
183	33489	6128487	13·5277493	5·6774114	·005464481
184	33856	6229504	13·5646600	5·6877340	·005434783
185	34225	6331625	13·6014705	5·6980192	·005405405
186	34596	6434856	13·6381817	5·7082675	·005376344
187	34969	6539203	13·6747943	5·7184791	·005347594
188	35344	6644672	13·7113092	5·7286543	·005319149
189	35721	6751269	13·7477271	5·7387936	·005291005
190	36100	6859000	13·7840488	5·7488971	·005263158
191	36481	6967871	13·8202750	5·7589652	·005235602
192	36864	7077888	13·8564065	5·7689982	·005208333
193	37249	7189057	13·8924400	5·7789966	·005181347
194	37636	7301384	13·9283883	5·7889604	·005154639
195	38025	7414875	13·9642400	5·7988900	·005128205
196	38416	7529536	14·0000000	5·8087857	·005102041
197	38809	7645373	14·0356688	5·8186479	·005076142
198	39204	7762392	14·0712473	5·8284867	·005050505
199	39601	7880599	14·1067360	5·8382725	·005025126
200	40000	8000000	14·1421356	5·8480355	·005000000
201	40401	8120601	14·1774469	5·8577660	·004975124
202	40804	8242408	14·2126704	5·8674673	·004950495
203	41209	8365427	14·2478068	5·8771307	·004926108
204	41616	8489664	14·2828569	5·8867653	·004901961
205	42025	8615125	14·3178211	5·8963685	·004878049
206	42436	8741816	14·3527001	5·9059406	·004854369
207	42849	8869743	14·3874946	5·9154817	·004830918
208	43264	8998912	14·4222051	5·9249921	·004807692
209	43681	9129329	14·4568323	5·9344721	·004784689
210	44100	9261000	14·4913767	5·9439220	·004761905
211	44521	9393931	14·5258390	5·9533418	·004739336
212	44944	9528128	14·5602198	5·9627320	·004716981
213	45369	9663597	14·5945195	5·9720926	·004694836
214	45796	9800344	14·6287388	5·9814240	·004672897
215	46225	9938375	14·6628783	5·9907264	·004651163
216	46656	10077696	14·6969385	6·0000000	·004629630
217	47089	10218313	14·7309199	6·0092450	·004608295
218	47524	10360232	14·7648231	6·0184617	·004587156
219	47961	10503459	14·7986486	6·0276502	·004566210
220	48400	10648000	14·8323970	6·0368107	·004545455
221	48841	10793861	14·8660687	6·0459435	·004524887
222	49284	10941048	14·8996644	6·0550489	·004504505
223	59729	11089567	14·9331845	6·0641270	·004484305
224	50176	11239424	14·9666295	6·0731779	·004464286
225	50625	11390625	15·0000000	6·0824020	·004444444
226	51076	11543176	15·0332964	6·0991994	·004424779
227	51529	11697083	15·0665192	6·1001702	·004405286
228	51984	11852352	15·0996689	6·1091147	·004385965
229	52441	12008989	15·1327460	6·1180332	·004366812
230	52900	12167000	15·1657509	6·1269257	·004347826
231	53361	12326391	15·1986842	6·1357924	·004329004
232	53824	12487168	15·2315462	6·1446337	·004310345
233	54289	12649337	15·2643375	6·1534495	·004291845
234	54756	12812904	15·2970585	6·1622401	·004273504
235	55225	12977875	15·3297097	6·1710058	·004255319
236	55696	13144256	15·3622915	6·1797466	·004237288
237	56169	13312053	15·3948043	6·1884628	·004219409

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
238	56644	13481272	15·4272486	6·1971544	·004201681
239	57121	13651919	15·4596248	6·2058218	·004184100
240	57600	13824000	15·4919334	6·2144650	·004166667
241	58081	13997521	15·5241747	6·2230843	·004149378
242	58564	14172488	15·5563492	6·2316797	·004132231
243	59049	14348907	15·5884573	6·2402515	·004115226
244	59536	14526784	15·6204994	6·2487998	·004098361
245	60025	14706125	15·6524758	6·2573248	·004081633
246	60516	14886936	15·6843871	6·2658266	·004065041
247	61009	15069223	15·7162336	6·2743054	·004048583
248	61504	15252992	15·7480157	6·2827613	·004032258
249	62001	15438249	15·7797338	6·2911946	·004016064
250	62500	15625000	15·8113883	6·2996053	·004000000
251	63001	15813251	15·8429795	6·3079935	·003984064
252	63504	16003008	15·8745079	6·3163596	·003968254
253	64009	16194277	15·9059737	6·3247035	·003952569
254	64516	16387064	15·9373775	6·3330256	·003937008
255	65025	16581375	16·9687194	6·3413257	·003921569
256	65536	16777216	16·0000000	6·3496042	·003906250
257	66049	16974593	16·0312195	6·3578611	·003891051
258	66564	17173512	16·0623784	6·3660968	·003875969
259	67081	17373979	16·0934769	6·3743111	·003861004
260	67600	17576000	16·1245155	6·3825043	·003846154
261	68121	17779581	16·1554944	6·3906765	·003831418
262	68644	17984728	16·1864141	6·3988279	·003816794
263	69169	18191447	16·2172747	6·4069585	·003802281
264	69696	18399744	16·2480768	6·4150687	·003787879
265	70225	18609625	16·2788206	6·4231583	·003773585
266	70756	18821096	16·3095064	6·4312276	·003759398
267	71289	19034163	16·3401346	6·4392767	·003745318
268	71824	19248832	16·3707055	6·4473057	·003731343
269	72361	19465109	16·4012195	6·4553148	·003717472
270	72900	19683000	16·4316767	6·4633041	·003703704
271	73441	19902511	16·4620776	6·4712736	·003690037
272	73984	20123648	16·4924225	6·4792236	·003676471
273	74529	20346417	16·5227116	6·4871541	·003663004
274	75076	20570824	16·5529454	6·4950653	·003649635
275	75625	20796875	16·5831240	6·5029572	·003636364
276	76176	21024576	16·6132477	6·5108300	·003623188
277	76729	21253933	16·6433170	6·5186839	·003610108
278	77284	21484952	16·6783320	6·5265189	·003597122
279	77841	21717639	16·7032931	6·5343351	·003584229
280	78400	21952000	16·7332005	6·5421326	·003571429
281	78961	22188041	16·7630546	6·5499116	·003558719
282	79524	22425768	16·7928556	6·5576722	·003546099
283	80089	22665187	16·8226038	6·5654144	·003533569
284	80656	22906304	16·8522995	6·5731385	·003522127
285	81225	23149125	16·8819430	6·5808443	·003508772
286	81796	23393656	16·9115345	6·5885323	·003496503
287	82369	23639903	16·9410743	6·5962023	·003484321
288	82944	23887872	16·9705627	6·6038545	·003472222
289	83521	24137569	17·0000000	6·6114890	·003460208
290	84100	24389000	17·0293864	6·6191060	·003448276
291	84681	24642171	17·0587221	6·6267054	·003436426
292	85264	24897088	17·0880075	6·6342874	·003424658
293	85849	25153757	17·1172428	6·6418522	·003412969
294	86436	25412184	17·1464282	6·6493998	·003401361
295	87025	25672375	17·1755640	6·6569302	·003389831
296	87616	25934336	17·2046505	6·6644437	·003378378
297	88209	26198073	17·2336879	6·6719403	·003367003

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
298	88804	26463592	17·2626765	6·6794200	·003355705
299	89401	26730899	17·2916165	6·6868831	·003344482
300	90000	27000000	17·3205081	6·6943295	·003333333
301	90601	27270901	17·3493516	6·7017593	·003322259
302	91204	27543608	17·3781472	6·7091729	·003311258
303	91809	27818127	17·4068952	6·7165700	·003301330
304	92416	28094464	17·4355958	6·7239508	·003289474
305	93025	28372625	17·4642492	6·7313155	·003278689
306	93636	28652616	17·4928557	6·7386641	·003267974
307	94249	28934443	17·5214155	6·7459967	·003257329
308	94864	29218112	17·5499288	6·7533134	·003246753
309	95481	29503629	17·5783958	6·7606143	·003236246
310	96100	29791000	17·6068169	6·7678995	·003225806
311	96721	30080231	17·6351921	6·7751690	·003215434
312	97344	30371328	17·6635217	6·7824229	·003205128
313	97969	30664297	17·6918060	6·7896613	·003194888
314	98596	30959144	17·7200451	6·7968844	·003184713
315	99225	31255875	17·7482393	6·8040921	·003174603
316	99856	31554496	17·7763888	6·8112847	·003164557
317	100489	31855013	17·8044938	6·8184620	·003154574
318	101124	32157432	17·8325545	6·8256242	·003144654
319	101761	32461759	17·8605711	6·8327714	·003134796
320	102400	32768000	17·8885438	6·8399037	·003125000
321	103041	33076161	17·9164729	6·8470213	·003115265
322	103684	33386248	17·9443584	6·8541240	·003105590
323	104329	33698267	17·9722008	6·8612120	·003095975
324	104976	34012224	18·0000000	6·8682855	·003086420
325	105625	34328125	18·0277564	6·8753433	·003076923
326	106276	34645976	18·0554701	6·8823888	·003067485
327	106929	34965783	18·0831413	6·8894188	·003058104
328	107584	35287552	18·1107703	6·8964345	·003048780
329	108241	35611289	18·1383571	6·9034359	·003039514
330	108900	35937000	18·1659021	6·9104232	·003030303
331	109561	36264691	18·1934054	6·9173964	·003021148
332	110224	36594368	18·2208672	6·9243556	·003012048
333	110889	36926037	18·2482876	6·9313088	·003003003
334	111556	37259704	18·2756669	6·9382321	·002994012
335	112225	37595375	18·3030052	6·9451496	·002985075
336	112896	37933056	18·3303028	6·9520533	·002976190
337	113569	38272753	18·3575598	6·9589434	·002967359
338	114244	38614472	18·3847763	6·9658198	·002958580
339	114921	38958219	18·4119526	6·9726826	·002949853
340	115600	39304000	18·4390889	6·9795321	·002941176
341	116281	39651821	18·4661853	6·9863681	·002932551
342	116964	40001688	18·4932420	6·9931906	·002923977
343	117649	40353607	18·5202592	7·0000000	·002915452
344	118336	40707584	18·5472370	7·0067962	·002906977
345	119025	41063625	18·5741756	7·0135791	·002898551
346	119716	41421736	18·6010752	7·0203490	·002890173
347	120409	41781923	18·6279360	7·0271058	·002881844
348	121104	42144192	18·6547581	7·0338497	·002873563
349	121801	42508549	18·6815417	7·0405860	·002865330
350	122500	42875000	18·7082869	7·0472987	·002857143
351	123201	43243551	18·7349940	7·0540041	·002849003
352	123904	43614208	18·7616630	7·0606967	·002840909
353	124609	43986977	18·7882942	7·0673767	·002832861
354	125316	44361864	18·8148877	7·0740440	·002824859
355	126025	44738875	18·8414437	7·0806988	·002816901
356	126736	45118016	18·8679623	7·0873411	·002808989
357	127449	45499293	18·8944436	7·0939709	·002801120

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
358	128164	45882712	18·9208879	7·1005885	·002793296
359	128881	46268279	18·9472953	7·1071937	·002785515
360	129600	46656000	18·9736660	7·1137866	·002777778
361	130321	47045881	19·0000000	7·1203674	·002770083
362	131044	47437928	19·0262976	7·1269360	·002762431
363	131769	47832147	19·0525589	7·1334925	·002754821
364	132496	48228544	19·0787840	7·1400370	·002747253
365	133225	48627125	19·1049732	7·1465695	·002739726
366	133956	49027896	19·1311265	7·1530901	·002732240
367	134689	49430863	19·1572441	7·1595988	·002724796
368	135424	49836032	19·1833261	7·1660957	·002717391
369	136161	50243409	19·2093727	7·1725809	·002710027
370	136900	50653000	19·2353841	7·1790544	·002702703
371	137641	51064811	19·2613603	7·1855162	·002695418
372	138384	51478848	19·2873015	7·1919663	·002688172
373	139129	51895117	19·3132079	7·1984050	·002680965
374	139876	52313624	19·3390796	7·2048322	·002673797
375	140625	52734375	19·3649167	7·2112479	·002666667
376	141376	53157376	19·3907194	7·2176522	·002659574
377	142129	53582633	19·4164878	7·2240450	·002652520
378	142884	54010152	19·4422221	7·2304268	·002645503
379	143641	54439939	19·4679223	7·2367972	·002638521
380	144400	54872000	19·4935887	7·2431565	·002631579
381	145161	55306341	19·5192213	7·2495045	·002624672
382	145924	55742968	19·5448203	7·2558415	·002617801
383	146689	56181887	19·5703858	7·2621675	·002610966
384	147456	56623104	19·5959179	7·2684824	·002604167
385	148225	57066625	19·6214169	7·2747864	·002597403
386	148996	57512456	19·6468827	7·2810794	·002590674
387	149769	57960603	19·6723156	7·2873617	·002583979
388	150544	58411072	19·6977156	7·2936330	·002577320
389	151321	58863869	19·7230829	7·2998936	·002570694
390	152100	59319000	19·7484177	7·3061436	·002564103
391	152881	59776471	19·7737199	7·3123828	·002557545
392	153664	60236288	19·7989899	7·3186114	·002551020
393	154449	60698457	19·8242276	7·3248295	·002544529
394	155236	61162984	19·8494332	7·3310369	·002538071
395	156025	61629875	19·8746069	7·3372339	·002531646
396	156816	62099136	19·8997487	7·3434205	·002525253
397	157609	62570773	19·9248588	7·3495966	·002518892
398	158404	63044792	19·9499373	7·3557624	·002512563
399	159201	63521199	19·9749844	7·3619178	·002506266
400	160000	64000000	20·0000000	7·3680630	·002500000
401	160801	64481201	20·0249844	7·3741979	·002493766
402	161604	64964808	20·0499377	7·3803227	·002487562
403	162409	65450827	20·0748599	7·3864373	·002481390
404	163216	65939264	20·0997512	7·3925418	·002475248
405	164025	66430125	20·1246118	7·3986363	·002469136
406	164836	66923416	20·1494417	7·4047206	·002463054
407	165649	67419143	20·1742410	7·4107950	·002457002
408	166464	67917312	20·1990099	7·4168595	·002450980
409	167281	68417929	20·2237484	7·4229142	·002444988
410	168100	68921000	20·2484567	7·4289589	·002439024
411	168921	69426531	20·2731349	7·4349938	·002433090
412	169744	69934528	20·2977831	7·4410189	·002427184
413	170569	70444997	20·3224014	7·4470342	·002421308
414	171396	70957944	20·3469899	7·4530399	·002415459
415	172225	71473375	20·3715488	7·4590359	·002409639
416	173056	71991296	20·3960781	7·4650223	·002406846
417	173889	72511713	20·4205779	7·4709991	·002398082

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
418	174724	73034632	20·4450483	7·4769664	·002392344
419	175561	73560059	20·4694895	7·4829242	·002386635
420	176400	74088000	20·4939015	7·4888724	·002380952
421	177241	74618461	20·5182845	7·4948113	·002375297
422	178084	75151448	20·5426386	7·5007406	·002369668
423	178929	75686967	20·5669638	7·5066607	·002364066
424	179776	76225024	20·5912603	7·5125715	·002358491
425	180625	76765625	20·6155281	7·5184730	·002352941
426	181476	77308776	20·6397674	7·5243652	·002347418
427	182329	77854483	20·6639783	7·5302482	·002341920
428	183184	78402752	20·6881609	7·5361221	·002336449
429	184041	78953589	20·7123152	7·5419867	·002331002
430	184900	79507000	20·7364414	7·5478423	·002325581
431	185761	80062991	20·7605395	7·5536888	·002320186
432	186624	80621568	20·7846097	7·5595263	·002314815
433	187489	81182737	20·8086520	7·5653548	·002309469
434	188356	81746504	20·8326667	7·5711743	·002304147
435	189225	82312875	20·8566536	7·5769849	·002298851
436	190096	82881856	20·8806130	7·5827865	·002293578
437	190969	83453453	20·9045450	7·5885793	·002288330
438	191844	84027672	20·9284495	7·5943633	·002283105
439	192721	84604519	20·9523268	7·6001385	·002277904
440	193600	85184000	20 9761770	7·6059049	·002272727
441	194481	85766121	21·0000000	7·6116626	·002267574
442	195364	86350888	21·0237960	7·6174116	·002262443
443	196249	86938307	21·0475652	7·6231519	·002257336
444	197136	87528384	21·0713075	7 6288837	·002252252
445	198025	88121125	21·0950231	7·6346067	·002247191
446	198916	88716536	21·1187121	7·6403213	·002242152
447	199809	89314623	21·1423745	7·6460272	·002237136
448	200704	89915392	21·1660105	7·6517247	·002232143
449	201601	90518849	21·1896201	7·6574138	·002227171
450	202500	91125000	21·2132034	7·6630943	·002222222
451	203401	91733851	21·2367606	7·6687665	·002217295
452	204304	92345408	21·2602916	7·6744303	·002212389
453	205209	92959677	21·2837967	7·6800857	·002207506
454	206116	93576664	21·3072758	7·6857328	·002202643
455	207025	94196375	21·3307290	7 6913717	·002197802
456	207936	94818816	21·3541565	7·6970023	·002192982
457	208849	95443993	21·3775583	7·7026246	·002188184
458	209764	96071912	21·4009346	7·7082388	·002183406
459	210681	96702579	21·4242853	7·7188448	·002178649
460	211600	97336000	21·4476106	7·7194426	·002173913
461	212521	97972181	21·4709106	7·7250325	·002169197
462	213444	98611128	21·4941853	7·7306141	·002164502
463	214369	99252847	21·5174348	7·7361877	·002159827
464	215296	99897344	21·5406592	7·7417532	·002155172
465	216225	100544625	21·5638587	7·7473109	·002150538
466	217156	101194696	21·5870331	7·7528606	·002145923
467	218089	101847563	21·6101828	7·7584023	·002141328
468	219024	102503232	21·6333077	7·7639361	·002136752
469	219961	103161709	21·6564078	7·7694620	·002132196
470	220900	103823000	21·6794834	7·7749801	·002127660
471	221841	104487111	21·7025344	7·7804904	·002123142
472	222784	105154048	21·7255610	7·7859928	·002118644
473	223729	105823817	21·7485632	7·7914875	·002114165
474	224676	106496424	21·7715411	7·7969745	·002109705
475	225625	107171875	21·7944947	7·8024538	·002105263
476	226576	107850176	21·8174242	7·8079254	·002100840
477	227529	108531333	21·8403297	7·8133892	·002096486

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
478	228484	109215352	21·8632111	7·8188456	·002092050
479	229441	109902239	21·8860686	7·8242942	·002087683
480	230400	110592000	21·9089023	7·8297353	·002083333
481	231361	111284641	21·9317122	7·8351688	·002079002
482	232324	111980168	21·9544984	7·8405949	·002074689
483	233289	112678587	21·9772610	7·8460134	·002070393
484	234256	113379904	22·0000000	7·8514244	·002066116
485	235225	114084125	22·0227155	7·8568281	·002061856
486	236196	114791256	22·0454077	7·8622242	·002057613
487	237169	115501303	22·0680765	7·8676130	·002053388
488	238144	116214272	22·0907220	7·8729944	·002049180
489	239121	116930169	22·1133444	7·8783684	·002044990
490	240100	117649000	22·1359436	7·8837352	·002040816
491	241081	118370771	22·1585198	7·8890946	·002036660
492	242064	119095488	22·1810730	7·8944468	·002032520
493	243049	119823157	22·2036033	7·8997917	·002028398
494	244036	120553784	22·2261108	7·9051294	·002024291
495	245025	121287375	22·2485955	7·9104599	·002020202
496	246016	122023936	22·2710575	7·9157832	·002016129
497	247009	122763473	22·2934968	7·9210994	·002012072
498	248004	123505992	22·3159136	7·9264085	·002008032
499	249001	124251499	22·3383079	7·9317104	·002004008
500	250000	125000000	22·3606798	7·9370053	·002000000
501	251001	125751501	22·3830293	7·9422931	·001996008
502	252004	126506008	22·4053565	7·9475739	·001992032
503	253009	127263527	22·4276615	7·9528477	·001988072
504	254016	128024064	22·4499443	7·9581144	·001984127
505	255025	128787625	22·4722051	7·9633743	·001980198
506	256036	129554216	22·4944438	7·9686271	·001976285
507	257049	130323843	22·5166605	7·9738731	·001972387
508	258064	131096512	22·5388553	7·9791122	·001968504
509	259081	131872229	22·5610283	7·9843444	·001964637
510	260100	132651000	22·5831796	7·9895697	·001960784
511	261121	133432831	22 6053091	7·9947883	·001956947
512	262144	134217728	22·6274170	8·0000000	·001953125
513	263169	135005697	22·6495033	8·0052049	·001949318
514	264196	135796744	22·6715681	8·0104032	·001945525
515	265225	136590875	22·6936114	8·0155946	·001941748
516	266256	137388096	22·7156334	8·0207794	·001937984
517	267289	138188413	22·7376341	8·0259574	·001934236
518	268324	138991832	22·7596134	8·0311287	·001930502
519	269361	139798359	22·7815715	8·0362935	·001926782
520	270400	140608000	22·8035085	8·0414515	·001923077
521	271441	141420761	22·8254244	8·0466030	·001919386
522	272484	142236648	22·8473193	8·0517479	·001915709
523	273529	143055667	22·8691933	8·0568862	·001912046
524	274576	143877824	22·8910463	8·0620180	·001908397
525	275625	144703125	22·9128785	8·0671432	·001904762
526	276676	145531576	22·9346899	8·0722620	·001901141
527	277729	146363183	22·9564806	8·0773743	·001897533
528	278784	147197952	22·9782506	8 0824800	·001893939
529	279841	148035889	23·0000000	8·0875794	·001890359
530	280900	148877000	23·0217289	8·0926723	·001886792
531	281961	149721291	23·0434372	8·0977589	·001883239
532	283024	150568768	23·0651252	8·1028390	·001879699
533	284089	151419437	23·0867928	8·1079128	·001876173
534	285156	152273304	23 1084400	8·1129803	·001872659
535	286225	153130375	23·1300670	8·1180414	·001869159
536	287296	153990656	23·1516738	8·1230962	·001865672
537	288369	154854153	23·1732605	8·1281447	·001862197

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
538	289444	155720872	23·1948270	8·1331870	·001858736
539	290521	156590819	23·2163735	8·1382230	·001855288
540	291600	157464000	23·2379001	8·1432529	·001851852
541	292681	158340421	23·2594067	8·1482765	·001848429
542	293764	159220088	23·2808935	8·1532939	·001845018
543	294849	160103007	23·3023604	8·1583051	·001841621
544	295936	160989184	23·3238076	8·1633102	·001838235
545	297025	161878625	23·3452351	8·1683092	·001834862
546	298116	162771336	23·3666429	8·1733020	·001831502
547	299209	163667323	23·3880311	8·1782888	·001828154
548	300304	164566592	23·4093998	8·1832695	·001824818
549	301401	165469149	23·4307490	8·1882441	·001821494
550	302500	166375000	23·4520788	8·1932127	·001818182
551	303601	167284151	23·4733892	8·1981753	·001814882
552	304704	168196608	23·4946802	8·2031319	·001811594
553	305809	169112377	23·5159520	8·2080825	·001808318
554	306916	170031464	23·5372046	8·2130271	·001805054
555	308025	170953875	23·5584380	8·2179657	·001081802
556	309136	171879616	23·5796522	8·2228985	·001798561
557	310249	172808693	23·6008474	8·2278254	·001795332
558	311364	173741112	23·6220236	8·2327463	·001792115
559	312481	174676879	23·6431808	8·2376614	·001788909
560	313600	175616000	23·6643191	8·2425706	·001785714
561	314721	176558481	23·6854386	8·2474740	·001782531
562	315844	177504328	23·7065392	8·2523715	·001779359
563	316969	178453547	23·7276210	8·2572635	·001776199
564	318096	179406144	23·7486842	8·2621492	·001773050
565	319225	180362125	23·7697286	8·2670294	·001769912
566	320356	181321496	23·7907545	8·2719039	·001766784
567	321489	182284263	23·8117618	8·2767726	·001763668
568	322624	183250432	23·8327506	8·2816255	·001760563
569	323761	184220009	23·8537209	8·2864928	·001757469
570	324900	185193000	23·8746728	8·2913444	·001754386
571	326041	186169411	23·8956063	8·2961903	·001751313
572	327184	187149248	23·9165215	8·3010304	·001748252
573	328329	188132517	23·9374184	8·3058651	·001745201
574	329476	189119224	23·9582971	8·3106941	·001742160
575	330625	190109375	23·9791576	8·3155175	·001739130
576	331776	191102976	24·0000000	8·3203353	·001736111
577	332929	192100033	24·0208243	8·3251475	·001733102
578	334084	193100552	24·0416306	8·3299542	·001730104
579	335241	194104539	24·0624188	8·3347553	·001727116
580	336400	195112000	24·0831891	8·3395509	·001724138
581	337561	196122941	24·1039416	8·3443410	·001721170
582	338724	197137368	24·1246762	8·3491256	·001718213
583	339889	198155287	24·1453929	8·3539047	·001715266
584	341056	199176704	24·1660919	8·3586784	·001712329
585	342225	100201625	24·1867732	8·3634466	·001709402
586	343396	201230056	24·2074369	8·3682095	·001706485
587	344569	202262003	24·2280829	8·3729668	·001703578
588	345744	203297472	24·2487113	8·3777188	·001700680
589	346921	204336469	24·2693222	8·3824653	·001697793
590	348100	205379000	24·2899156	8·3872065	·001694915
591	349281	206425071	24·3104996	8·3919428	·001692047
592	350464	207474688	24·3310501	8·3966729	·001689189
593	351649	208527857	24·3515913	8·4013981	·001686341
594	352836	209584584	24·3721152	8·4061180	·001683502
595	354025	210644875	24·3926218	8·4108326	·001680672
596	355216	211708736	24·4131112	8·4155419	·001677852
597	356409	212776173	24·4335834	8·4202460	·001675042

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
598	357604	213847192	24·4540385	8·4249448	·001672241
599	358801	214921799	24·4744765	8·4296383	·001669449
600	360000	216000000	24·4948974	8·4343267	·001666667
601	361201	217081801	24·5153013	8·4390098	·001663894
602	362404	218167208	24·5356883	8·4436877	·001661130
603	363609	219256227	24·5560583	8·4483605	·001658375
604	364816	220348864	24·5764115	8·4530281	·001655629
605	366025	221445125	24·5967478	8·4576906	·001652893
606	367236	222545016	24·6170673	8·4623479	·001650165
607	368449	223648543	24·6373700	8·4670001	·001647446
608	369664	224755712	24·6576560	8·4716471	·001644737
609	370881	225866529	24·6779254	8·4762892	·001642036
610	372100	226981000	24·6981781	8·4809261	·001639344
611	373321	228099131	24·7184142	8·4855579	·001636661
612	374544	229220928	24·7386338	8·4901848	·001633987
613	375769	230346397	24·7588368	8·4948065	·001631321
614	376996	231475544	24·7790234	8·4994233	·001628664
615	378225	232608375	24·7991935	8·5040350	·001626016
616	379456	233744896	24·8193473	8·5086417	·001623377
617	380689	234885113	24·8394847	8·5132435	·001620746
618	381924	236029032	24·8596058	8·5178403	·001618123
619	383161	237176659	24·8797106	8·5224331	·001615509
620	384400	238328000	24·8997992	8·5270189	·001612903
621	385641	239483061	24·9198716	8·5316009	·001610306
622	386884	240641848	24·9399278	8·5361780	·001607717
623	388129	241804367	24·9599679	8·5407501	·001605136
624	389376	242970624	24·9799920	8·5453173	·001602564
625	390625	244140625	25·0000000	8·5498797	·001600000
626	391876	245134376	25·0199920	8·5544372	·001597444
627	393129	246491883	25·0399681	8·5589899	·001594896
628	394384	247673152	25·0599282	8·5635377	·001592357
629	395641	248858189	25·0798724	8·5680807	·001589825
630	396900	250047000	25·0998008	8·5726189	·001587302
631	398161	251239591	25·1197134	8·5771523	·001584786
632	399424	252435968	25·1396102	8·5816809	·001582278
633	400689	253636137	25·1594913	8·5862247	·001579779
634	401956	254840104	25·1793566	8·5907238	·001577287
635	403225	256047875	25·1992063	8·5952380	·001574803
636	404496	257259456	25·2190404	8·5997476	·001572327
637	405769	258474853	25·2388589	8·6042525	·001569859
638	407044	259694072	25·2586619	8·6087526	·001567398
639	408321	260917119	25·2784493	8·6132480	·001564945
640	409600	262144000	25·2982213	8·6177388	·001562500
641	410881	263374721	25·3179778	8·6222248	·001560062
642	412164	264609288	25·3377189	8·6267063	·001557632
643	413449	265847707	25·3574447	8·6311830	·001555210
644	414736	267089984	25·3771551	8·6356551	·001552795
645	416025	268336125	25·3968502	8·6401226	·001550388
646	417316	269586136	25·4165302	8·6445855	·001547988
647	418609	270840023	25·4361947	8·6490437	·001545595
648	419904	272097792	25·4558441	8·6534974	·001543210
649	421201	273359449	25·4754784	8·6579465	·001540832
650	422500	274625000	25·4950976	8·6623911	·001538462
651	423801	275894451	25·5147013	8·6668310	·001536098
652	425104	277167808	25·5342907	8·6712665	·001533742
653	426409	278445077	25·5538647	8·6756974	·001531394
654	427716	279726264	25·5734237	8·6801237	·001529052
655	429025	281011375	25·5929678	8·6845456	·001526718
656	430336	282300416	25·6124969	8·6889630	·001524390
657	431649	283593393	25·6320112	8·6933759	·001522070

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
658	432964	284890312	25·6515107	8·6977843	·001519751
659	434281	286191179	25·6709953	8·7021882	·001517451
660	435600	287496000	25·6904652	8·7065887	·001515152
661	436921	288804781	25·7099203	8·7109827	·001512859
662	438244	290117528	25·7293607	8·7153734	·001510574
663	439569	291434247	25·7487864	8·7197596	·001508296
664	440896	292754944	25·7681975	8·7241414	·001506024
665	442235	294079625	25·7875939	8·7285187	·001503759
666	443556	295408296	25·8069758	8·7358918	·001501502
667	444899	296740963	25·8263431	8·7372604	·001499250
668	446224	298077632	25·8456960	8·7416246	·001497006
669	447561	299418309	25·8650343	8·7459846	·001494768
670	448900	300763000	25·8843582	8·7503401	·001492537
671	450241	302111711	25·9936677	8·7546913	·001490313
672	451584	303464448	25·9229628	8·7590383	·001488095
673	452929	304821217	25·9422435	8·7633809	·001485884
674	454276	306182024	25·9615100	8·7677192	·001483680
675	455625	307546875	25·9807621	8·7720532	·001481481
676	456976	308915776	26·0000000	8·7763830	·001479290
677	458329	310288733	26·0192237	8·7807084	·001477105
678	459684	311665752	26·0384331	8·7850296	·001474926
679	461041	313046839	26·0576284	8·7893466	·001472754
680	462400	314432000	26·0768096	8·7936593	·001470588
681	463761	315821241	26·0959767	8·7979679	·001468429
682	465124	317214568	26·1151297	8·8022721	·001466276
683	466489	318611987	26·1342687	8·8065722	·001464129
684	467856	320013504	26·1533937	8·8108681	·001461988
685	469225	321419125	26·1725047	8·8151598	·001459854
686	470596	322828856	26·1916017	8·8194447	·001457726
687	471969	324242703	26·2106848	8·8237307	·001455604
688	473344	325660672	26·2297541	8·8280099	·001453488
689	474721	327082769	26·2488095	8·8322850	·001451379
690	476100	328509000	26·2678511	8·8365559	·001449275
691	477481	329939371	26·2868789	8·8408227	·001447178
692	478864	331373888	26·3058929	8·8450854	·001445087
693	480249	332812557	26·3248932	8·8493440	·001443001
694	481636	334255384	26·3438797	8·8535985	·001440922
695	483025	335702375	26·3628527	8·8578489	·001438849
696	484416	337153536	26·3818119	8·8620952	·001436782
697	485809	338608873	26·4007576	8·8663375	·001434720
698	487204	340068392	26·4196896	8·8705757	·001432665
699	488601	341532099	26·4386081	8·8748099	·001430615
700	490000	343000000	26·4575131	8·8790400	·001428571
701	491401	344472101	26·4764046	8·8832661	·001426534
702	492804	345948408	26·4952826	8·8874882	·001424501
703	494209	347428927	26·5141472	8·8917063	·001422475
704	495616	348913664	26·5329983	8·8959204	·001420455
705	497025	350402625	26·5518361	8·9001304	·001418440
706	498436	351895816	26·5706605	8·9043366	·001416431
707	499849	353393243	26·5894716	8·9085387	·001414427
708	501264	354894912	26·6082694	8·9127369	·001412429
709	502681	356400829	26·6270539	8·9169311	·001410437
710	504100	357911000	26·6458252	8·9211214	·001408451
711	505521	359425431	26·6645833	8·9253078	·001406470
712	506944	360944128	26·6833281	8·9294092	·001404494
713	508369	362467097	26·7020598	8·9336687	·001402525
714	509796	363994344	26·7207784	8·9378433	·001400560
715	511225	365525875	26·7394839	8·9420140	·001398601
716	512656	367061696	26·7581763	8·9461809	·001396648
717	514089	368601813	26·7768557	8·9503438	·001394700

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
718	515524	370146232	26·7955220	8·9545029	·001392758
719	516961	371694959	26·8141754	8·9586581	·001390821
720	518400	373248000	26·8328157	8·9628095	·001388889
721	519841	374805361	26·8514432	8·9669570	·001386963
722	521284	376367048	26·8700577	8·9711007	·001385042
723	522729	377933067	26·8886593	8·9752406	·001383126
724	524176	379503424	26·9072481	8·9793766	·001381215
725	525625	381078125	26·9258240	8 9835089	·001379310
726	527076	382657176	26·9443872	8·9876373	·001377410
727	528529	382440583	26·9629375	8·9917620	·001375516
728	529984	385828352	26·9814751	8·9958899	·001373626
729	531441	387420489	27·0000000	9·0000000	·001371742
730	532900	389017000	27·0185122	9·0041134	·001369863
731	534361	390617891	27·0370117	9 0082229	·001367989
732	535824	392223168	27·0554985	9·0123288	·001366120
733	537289	393832837	27·0739727	9·0164309	·001364256
734	538756	395446904	27·0924344	9 0205293	·001362398
735	540225	397065375	27·1108834	9·0246239	·001360544
736	541696	398688256	27·1293199	9·0287149	·001358696
737	543169	400315553	27·1477149	9·0328021	·001356852
738	544644	401947272	27·1661554	9·0368857	·001355014
739	546121	403583419	27·1845544	9·0409655	·001353180
740	547600	405224000	27·2029140	9·0450419	·001351351
741	549081	406869021	27·2213152	9·0491142	·001349528
742	550564	408518488	27·2396769	9·0531831	·001347709
743	552049	410172407	27·2580263	9·0572482	·001345895
744	553536	411830784	27·2763634	9·0613098	·001344086
745	555025	413493625	27·2946881	9·0653677	·001342282
746	556516	415160936	27·3130006	9·0694220	·001340483
747	558009	416832723	27·3313007	9·0734726	·001338688
748	559504	418508992	27·3495887	9·0775197	·001336898
749	561001	420189749	27·3678644	9·0815631	·001335113
750	562500	421875000	27·3861279	9·0856030	·001333333
751	564001	423564751	27·4043792	9·0896352	·001331558
752	565504	425259908	27·4226184	9·0936719	·001329787
753	567009	426957777	27·4408455	9·0977010	·001328021
754	568516	428661064	27·4590604	9·1017265	·001326260
755	570025	430368875	27·4772633	9·1057485	·001324503
756	571536	432081216	27·4954542	9·1097669	·001322751
757	573049	433798093	27·5136330	9·1137818	·001321004
758	574564	435519512	27·5317998	9·1177931	·001319261
759	576081	437245479	27·5499546	9·1218010	·001317523
760	577600	438976000	27·5680975	9·1258053	·001315789
761	579121	440711081	27·5862284	9·1298061	·001314060
762	580644	442450728	27·6043475	9·1338034	·001312336
763	582169	444194947	27·6224546	9 1377971	·001310616
764	583696	445943744	27·6405499	9·1417874	·001308901
765	585225	447697120	27·6586334	9·1457742	·001307190
766	586756	449455096	27·6767050	9·1497576	·001305483
767	588289	451217663	27·6947648	9·1537375	·001303781
768	589824	452984832	27·7128129	9·1577139	·001302083
769	591361	454756609	27·7308492	9·1616869	·001300390
770	592900	456533000	27·7488739	9·1656565	·001298701
771	594441	458314011	27·7668868	9·1696225	·001297017
772	595084	460099648	27·7848880	9·1735852	·001295337
773	597529	461889917	27·8028775	9·1775445	·001293661
774	599076	463684824	27·8028555	9·1815003	·001291990
775	600625	465484375	27·8388218	9·1854527	·001290323
776	602176	467288576	27·8567766	9·1894018	·001288660
777	603729	469097433	27·8747197	9·1933474	·001287001

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
778	605284	470910952	27·8926514	9·1972897	·001285347
779	606841	472729139	27·9105715	9·2012286	·001283697
780	608400	474552000	27·9284801	9·2051641	·001282051
781	609961	476379541	27·9463772	9·2090962	·001280410
782	611524	478211768	27·9642629	9·2130250	·001278772
783	613089	480048687	27·9821372	9·2169505	·001277139
784	614656	481890304	28·0000000	9·2208726	·001275510
785	616225	483736625	28·0178515	9·2247914	·001273885
786	617796	485587656	28·0356915	9·2287068	·001272265
787	619369	487443403	28·0535203	9·2326189	·001270648
788	620944	489303872	28·0713377	9·2365277	·001269036
789	622521	491169069	28·0891438	9·2404333	·001267427
790	624100	493039000	28·1069386	9·2442355	·001265823
791	625681	494913671	28·1247222	9·2482344	·001264223
792	627264	496793088	28·1424946	9·2521300	·001262626
793	628849	498677257	28·1602557	9·2560224	·001261034
794	630436	500566184	28·1780056	9·2599114	·001259446
795	632025	502459875	28·1957444	9·2637973	·001257862
796	633616	504358336	28·2134720	9·2676798	·001256281
797	635209	506261573	28·2311884	9·2715592	·001254705
798	636804	508169592	28·2488938	9·2754352	·001253133
799	638401	510082399	28·2665881	9·2793081	·001251364
800	640000	512000000	28·2842712	9·2831777	·001250000
801	641601	513922401	28·3019434	9·2870444	·001248439
802	643204	515849608	28·3196045	9·2909072	·001246883
803	644809	517781627	28·3372546	9·2947671	·001245330
804	646416	519718464	28·3548938	9·2986239	·001243781
805	648025	521660125	28·3725219	9·3024775	·001242236
806	649636	523606616	28·3901391	9·3063278	·001240695
807	651249	525557943	28·4077454	9·3101750	·001239157
808	652864	527514112	28·4253408	9·3140190	·001237624
809	654481	529475129	28·4429253	9·3178599	·001236094
810	656100	531441000	28·4604989	9·3216975	·001234568
811	657721	533411731	28·4780617	9·3255320	·001233046
812	659344	535387328	28·4956137	9·3293634	·001231527
813	660969	537367797	28·5131549	9·3331916	·001230012
814	662596	539353144	28·5306852	9·3370167	·001228501
815	664225	541343375	28·5482048	9·3408386	·001226994
816	665856	543338496	28·5657137	9·3446575	·001225499
817	667489	545338513	28·5832119	9·3484731	·001223990
818	669124	547343432	28·6006993	9·3522857	·001222494
819	670761	549353259	28·6181760	9·3560952	·001221001
820	672400	551368000	28·6356421	9·3599016	·001219512
821	674041	553387661	28·6530976	9·3637049	·001218027
822	675684	555412248	28·6705424	9·3675051	·001216545
823	677329	557441767	28·6879716	9·3713022	·001215067
824	678976	559476224	28·7054002	9·3750963	·001213592
825	680625	561515625	28·7228132	9·3788873	·001212121
826	682276	563559976	28·7402157	9·3826752	·001210654
827	683929	565609283	28·7576077	9·3864600	·001209190
828	685584	567663552	28·7749891	9·3902419	·001207729
829	687241	569722789	28·7923601	9·3940206	·001206273
830	688900	571787000	28·8097206	9·3977964	·001204819
831	690561	573856191	28·8270706	9·4015691	·001203369
832	692224	575930368	28·8444102	9·4053387	·001201923
833	693889	578009537	28·8617394	9·4091054	·001200480
834	695556	580093704	28·8790582	9·4128690	·001199041
835	697225	582182875	28·8963666	9·4166297	·001197605
836	698896	584277056	28·9136646	9·4203873	·001196172
837	700569	586376253	28·9309523	9·4241420	·001194743

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
838	702244	588480472	28·9482297	9·4278936	·001193317
839	703921	590589719	28·9654967	9·4316423	·001191895
840	705600	592704000	28·9827535	9·4353800	·001190476
841	707281	594823321	29·0000000	9·4391307	·001189061
842	708964	596947688	29·0172363	9·4428704	·001187648
843	710649	599077107	29·0344623	9·4466072	·001186240
844	712336	601211584	29·0516781	9·4503410	·001184834
845	714025	603351125	29·0688837	9·4540719	·001183432
846	715716	605495736	29·0860791	9·4577999	·001182033
847	717409	607645423	29·1032644	9·4615249	·001180638
848	719104	609800192	29·1204396	9·4652470	·001179245
849	720801	611960046	29·1376046	9·4689661	·001177856
850	722500	614126000	29·1547595	9·4726824	·001176471
851	724201	616295051	29·1719043	9·4763957	·001175088
852	725904	618470208	29·1890390	9·4801061	·001173709
853	727609	620650477	29·2061637	9·4838136	·001172333
854	729316	622835864	29·2232784	9·4875128	·001170960
855	731025	625026375	29·2403830	9·4912200	·001169591
856	732736	627222016	29·2574777	9·4949188	·001168224
857	734449	629422793	29·2745623	9·4986147	·001166861
858	736164	631628712	29·2916370	9·5023078	·001165501
859	737881	633839779	29·3087018	9·5059980	·001164144
860	739600	636056000	29·3257566	9·5096854	·001162791
861	741321	638277381	29·3428015	9·5133699	·001161440
862	743044	640503928	29·3598365	9·5170515	·001160093
863	744769	642735647	29·3768616	9·5207303	·001158749
864	746496	644972544	29·3938769	9·5244063	·001157407
865	748225	647214625	29·4108823	9·5280794	·001156069
866	749956	649461896	29·4278779	9·5317497	·001154734
867	751689	651714363	29·4448637	9·5354172	·001153403
868	753424	653972032	29·4618397	9·5390818	·001152074
869	755161	656234909	29·4788059	9·5427437	·001150748
870	756900	658503000	29·4957624	9·5464027	·001149425
871	758641	660776311	29·5127091	9·5500589	·001148106
872	760384	663054848	29·5296461	9·5537123	·001146789
873	762129	665338617	29·5465734	9·5573630	·001145475
874	763876	667627624	29·5634910	9·5610108	·001144165
875	765625	669921875	29·5803989	9·5646559	·001142857
876	767376	672221376	29 5972972	9·5682782	·001141553
877	769129	674526133	29·6141858	9·5719377	·001140251
878	770384	676836152	29·6310648	9·5755745	·001138952
879	772641	679151439	29·6479342	9·5792085	·001137656
880	774400	681472000	29·6647939	9·5828397	·001136364
881	776161	683797841	29·6816442	9·5864682	·001135074
882	777924	686128968	29·6984848	9·5900937	·001133787
883	779689	688465387	29·7153159	9·5937169	·001132523
884	781456	690807104	29·7321375	9·5973373	·001131222
885	783225	693154125	29·7489496	9·6009548	·001129944
886	784996	695506456	29·7657521	9·6045696	·001128668
887	786769	697864103	29·7825452	9·6081817	·001127396
888	788544	700227072	29·7993289	9·6117911	·001126126
889	790321	702595369	29·8161030	9·6153977	·001124859
890	792100	704969000	29·8328678	9·6190017	·001123596
891	793881	707347971	29·8496231	9·6226030	·001122334
892	795664	707932288	29·8663690	9·6262016	·001121076
893	797449	712121957	29·8831056	9·6297975	·001119821
894	799236	714516984	29·8998328	9·6333907	·001118568
895	801025	716917375	29·9165506	9·6369812	·001117818
896	802816	719328436	29·9332591	9·6405690	·001116071
897	804609	721734273	29·9499583	9·6441542	·001114827

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
898	806404	724150792	29·9666481	9·6477367	·001113586
899	808201	726572699	29·9833287	9·6513166	·001112347
900	810000	729000000	30·0000000	9·6548938	·001111111
901	811801	731432701	30·0166621	9·6584684	·001109878
902	813604	733870808	30·0333148	9·6620403	·001108647
903	815409	736314327	30·0499584	9·6656096	·001107420
904	817216	738763264	30·0665928	9·6691762	·001106195
905	819025	741217625	30·0832179	9·6727403	·001104972
906	820836	743677416	30·0998339	9·6763017	·001103753
907	822649	746142643	30·1164407	9·6798604	·001102536
908	824464	748613312	30 1330383	9·6834166	·001101322
909	826281	751089429	30·1496269	9·6869701	·001100110
910	828100	753571000	30·1662063	9·6905211	·001098901
911	829921	756058031	30·1827765	9·6940694	·001097695
912	831744	758550528	30·1993377	9·6976151	·001096491
913	833569	761048497	30·2158899	9·7011583	·001095290
914	835396	763551944	30·2324329	9·7046989	·001094092
915	837225	766060875	30·2489669	9·7082369	·001092896
916	839056	768575296	30·2654919	9·7117723	·001091703
917	840889	771095213	30·2820079	9·7153051	·001090513
918	842724	773620632	30·2985148	9·7188354	·001089325
919	844561	776151559	30·3150128	9·7223631	·001088139
920	846400	778688000	30·3315018	9·7258883	·001086957
921	848241	781229961	30·3479818	9·7294109	·001085776
922	850084	783777448	30·3644529	9·7329309	·001084599
923	851929	786330467	30·3809151	9·7364484	·001083423
924	853776	788889024	30·3973683	9·7399634	·001082251
925	855625	791453125	30·4138127	9·7434758	·001081081
926	857476	794022776	30·4302481	9·7469857	·001079914
927	859329	796597983	30·4466747	9·7504930	·001078749
928	861184	799178752	30·4630924	9·7539979	·001077586
929	863041	801765089	30·4795013	9 7575002	·001076426
930	864900	804357000	30 4959014	9 7610001	·001075269
931	866761	806954491	30·5122926	9·7644974	·001074114
932	868624	809557568	30·5286750	9·7679922	·001072961
933	870489	812166237	30·5450487	9·7714845	·001071811
934	872356	814780504	30·5614136	9·7749743	·001070664
935	874225	817400375	30·5777697	9·7784616	·001069519
936	876096	820025856	30·5941171	9·7829466	·001068376
937	877969	822656953	30·6104557	9·7854288	·001067236
938	879844	825293672	30·6267857	9·7889087	·001066098
939	881721	827936019	30·6431069	9·7923861	·001064963
940	883600	830584000	30·6594194	9·7958611	·001063830
941	885481	833237621	30·6757233	9·7993336	·001062699
942	887364	835896888	30·6920185	9·8028036	·001061571
943	889249	838561807	30·7083051	9·8062711	·001060445
944	891136	841232384	30·7245830	9·8097362	·001059322
945	893025	843908625	30·7408523	9·8131989	·001058201
946	894916	846590536	30·7571130	9·8166591	·001057082
947	896808	849278123	30·7733651	9·8201169	·001055966
948	898704	851971392	30·7896086	9·8235723	·001054852
949	900601	854670349	30 8058436	9·8270252	·001053741
950	902500	857375000	30·8220700	9·8304757	·001052632
951	904401	860085351	30·8382879	9·8339238	·001051525
952	906304	862801408	30·8544972	9·8373695	·001050420
953	908209	865523177	30·8706981	9·8408127	·001049318
954	910116	868250664	30·8868904	9·8442536	·001048218
955	912025	870983875	30·9030743	9·8476920	·001047120
956	913936	873722816	30·9192477	9·8511280	·001046025
957	915849	876467493	30·9354166	9·8545617	·001044932

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
958	917764	879217912	30·9515751	9·8579929	·001043841
959	919681	881974079	30·9677251	9·8614218	·001042753
960	921600	884736000	30·9838668	9·8648483	·001041667
961	923521	887503681	31·0000000	9·8682724	·001040583
962	925444	890277128	31·0161248	9·8716941	·001039501
963	927369	893056347	31·0322413	9·8751135	·001038422
964	929296	895841344	31·0483494	9·8785305	·001037344
965	931225	898632125	31·0644491	9·8819451	·001036269
966	933156	901428696	31·0805405	9·8853574	·001035197
967	935089	904231063	31·0966236	9·8887673	·001034126
968	937024	907039232	31·1126984	9·8921749	·001033058
969	938961	909853209	31·1287648	9·8955801	·001031992
970	940900	912673000	31·1448230	9·8989830	·001030928
971	942841	915498611	31·1608729	9·9023835	·001029866
972	944784	918330048	31·1769145	9·9057817	·001028807
973	946729	921167317	31·1929479	9·9091776	·001027749
974	948676	924010424	31·2089731	9·9125712	·001026694
975	950625	926859375	31·2249900	9·9159624	·001025641
976	952576	929714176	31·2409987	9·9193513	·001024590
977	954529	932574833	31·2569992	9·9227379	·001023541
978	956484	935441352	31·2729915	9·9261222	·001022495
979	958441	938313739	31·2889757	9·9295042	·001021450
980	960400	941192000	31·3049517	9·9328839	·001020408
981	962361	944076141	31·3209195	9·9362613	·001019168
982	964324	946966168	31·3368792	9·9396363	·001018330
983	966289	949862087	31·3528308	9·9430092	·001017294
984	968256	952763904	31·3687743	9·9463797	·001016260
985	970225	955671625	31·3847097	9·9497479	·001015228
986	972196	958585256	31·4006369	9·9531138	·001014199
987	974169	961504803	31·4165561	9·9564775	·001013171
988	976144	964430272	31·4324673	9·9598389	·001012146
989	978121	967361669	31·4483704	9·9631981	·001011122
990	980100	970299000	31·4642654	9·9665549	·001010101
991	982081	973242271	31·4801525	9·9699055	·001009082
992	984064	976191488	31·4960315	9·9732619	·001008065
993	986049	979146657	31·5119025	9·9766120	·001007049
994	988036	982107784	31·5277655	9·9799599	·001006036
995	990025	985074875	31·5436206	9·9833055	·001005025
996	992016	988047936	31·5594677	9·9866488	·001004016
997	994009	991026973	31·5753068	9·9899900	·001003009
998	996004	994011992	31·5911380	9·9933289	·001002004
999	998001	997002999	31·6069613	9·9966656	·001001001
1000	1000000	1000000000	31·6227766	10·0000000	·001000000
1001	1002001	1003003001	31·6385840	10·0033222	·0009990010
1002	1004004	1006012008	31·6543866	10·0066622	·0009980040
1003	1006009	1009027027	31·6701752	10·0099899	·0009970090
1004	1008016	1012048064	31·6859590	10·0133155	·0009960159
1005	1010025	1015075125	31·7017349	10·0166389	·0009950249
1006	1012036	1018108216	31·7175030	10·0199601	·0009940358
1007	1014049	1021147343	31·7332633	10·0232791	·0009930487
1008	1016064	1024192512	31·7490157	10·0265958	·0009920635
1009	1018081	1027243729	31·7647603	10·0299104	·0009910803
1010	1020100	1030301000	31·7804972	10·0332228	·0009900990
1011	1022121	1033364331	31·7962262	10·0365330	·0009891197
1012	1024144	1036433728	31·8119474	10·0398410	·0009881423
1013	1026169	1039509197	81·8276609	10·0431469	·0009871668
1014	1028196	1042590744	31·8433666	10·0464506	·0009861933
1015	1030225	1045678375	31·8590646	10·0497521	·0009852217
1016	1032256	1048772096	31·8747549	10·0530514	·0009842520
1017	1034289	1051871913	31·8904374	10·0563485	·0009832842

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
1018	1036324	1054977832	31·9061123	10·0596435	·0009823183
1019	1038361	1058089859	31 9217794	10·0629364	·0009813543
1020	1040400	1061208000	31·9374388	10·0662271	·0009803922
1021	1042441	1064332261	31·9530906	10 0695156	·0009794319
1022	1044484	1067462648	31·9687347	10·0728020	·0009784736
1023	1046529	1070599167	31·9843712	10·0760863	·0009775171
1024	1048576	1073741824	32·0000000	10·0793684	·0009765625
1025	1050625	1076890625	32·0156212	10·0826484	·0009756098
1026	1052676	1080045576	32·0312348	10·0859262	·0009746589
1027	1054729	1083206683	32·0468407	10·0892019	·0009737098
1028	1056784	1086373952	32·0624391	10·0924755	·0009727626
1029	1058841	1089547389	32·0780298	10·0957469	·0009718173
1030	1060900	1092727000	32·0936131	10·0990163	·0009708738
1031	1062961	1095912791	32·1091887	10 1022835	·0009699321
1032	1065024	1099104768	32·1247568	10·1055487	·0009689922
1033	1067089	1102302937	32·1403173	10·1088117	·0009680542
1034	1069156	1105507304	32·1558704	10·1120726	·0009671180
1035	1071225	1108717875	32·1714159	10·1153314	·0009661836
1036	1073296	1111934656	32·1869539	10·1185882	·0009652510
1037	1075369	1115157653	32·2024844	10·1218428	·0009643202
1038	1077444	1118386872	32·2180074	10·1250953	·0009633911
1039	1079521	1121622319	32·2335229	10·1283457	·0009624639
1040	1081600	1124864000	32·2490310	10·1315941	·0009615385
1041	1083681	1128111921	32·2645316	10·1348403	·0009606148
1042	1085764	1131366088	32·2800248	10·1380845	·0009596929
1043	1087849	1134626507	32·2955105	10·1413266	·0009587738
1044	1089936	1137893184	32·3109888	10·1445667	·0009578544
1045	1092025	1141166125	32·3264598	10·1478047	·0009569378
1046	1094116	1144445336	32·3419233	10·1510406	·0009560229
1047	1096209	1147730823	32·3573794	10·1542744	·0009551098
1048	1098304	1151022592	32·3728281	10·1575062	·0009541985
1049	1100401	1154320649	32·3882695	10·1607359	·0009532888
1050	1102500	1157625000	32·4037035	10·1639636	·0009523810
1051	1104601	1160935651	32·4191301	10·1671893	·0009514748
1052	1106704	1164252608	32·4345495	10·1704129	·0009505703
1053	1108809	1167575877	32·4499615	10·1736344	·0009496676
1054	1110916	1170905464	32·4653662	10·1768539	·0009487666
1055	1113125	1174241375	32·4807635	10·1800714	·0009478673
1056	1115136	1177583616	32·4961536	10·1832868	·0009469697
1057	1117249	1180932193	32·5115364	10·1865002	·0009460738
1058	1119364	1184287112	32·5269119	10·1897116	·0009451796
1059	1121481	1187648379	32·5422802	10·1929209	·0009442871
1060	1123600	1191016000	32·5576412	10·1961283	·0009433962
1061	1125721	1194389981	32·5729949	10·1993336	·0009425071
1062	1127844	1197770328	32·5883415	10·2025369	·0009416196
1063	1129969	1201157047	32·6035807	10·2057382	·0009407338
1064	1132096	1204550144	32·6190129	10·2089375	·0009398496
1065	1134225	1207949625	32·6343377	10·2121347	·0009389671
1066	1136356	1211355496	32·6496554	10·2153300	·0009380863
1067	1138489	1214767763	32·6649659	10·2185233	·0009372071
1068	1140624	1218186432	32·6802693	10·2217146	·0009363296
1069	1142761	1221611509	32·6955654	10·2249039	·0009354537
1070	1144900	1225043000	32·7108544	10·2280912	·0009345794
1071	1147041	1228480911	32·7261363	10 2312766	·0009337068
1072	1149184	1231925248	32·7414111	10·2344599	·0009328358
1073	1151329	1235376017	32·7566787	10·2376413	·0009319664
1074	1153476	1238833224	32·7719392	10·2408207	·0009310987
1075	1155625	1242296875	32·7871926	10·2439981	·0009302326
1076	1157776	1245766976	32·8024398	10·2471735	·0009293680
1077	1159929	1249243533	32·8176782	10·2503470	·0009285051

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
1078	1162084	1252726552	32·8329103	10·2535186	·0009276438
1079	1164241	1256216039	32·8481354	10·2566881	·0009267841
1080	1166400	1259712000	32·8633535	10·2598557	·0009259259
1081	1168561	1263214441	32·8785644	10·2630213	·0009250694
1082	1170724	1266723368	32·8937684	10·2661850	·0009242144
1083	1172889	1270238787	32·9089653	10·2693467	·0009233610
1084	1175056	1273760704	32·9241553	10·2725065	·0009225092
1085	1177225	1277289125	32·9393382	10·2756644	·0009216590
1086	1179396	1280824056	32·9545141	10·2788203	·0009208103
1087	1181569	1284365503	32·9696830	10·2819743	·0009199632
1088	1183744	1287913472	32·9848450	10·2851264	·0009191176
1089	1185921	1291467969	33·0000000	10·2882765	·0009182736
1090	1188100	1295029000	33·0151480	10·2914247	·0009174312
1091	1190281	1298596571	33·0302891	10·2945709	·0009165903
1092	1192464	1302170688	33·0454233	10·2977153	·0009157509
1093	1194649	1305751357	33·0605505	10·3008577	·0009149131
1094	1196836	1309338584	33·0756708	10·3039982	·0009140768
1095	1199025	1312932375	33·0907842	10·3071368	·0009132420
1096	1201216	1316532736	33·1058907	10·3102735	·0009124008
1097	1203409	1320139673	33·1209903	10·3134083	·0009115770
1098	1205604	1323753192	33·1360830	10·3165411	·0009107468
1099	1207801	1327373299	33·1511689	10·3196721	·0009099181
1100	1210000	1331000000	33·1662479	10·3228012	·0009090909
1101	1212201	1334633301	33·1813200	10·3259284	·0009082652
1102	1214404	1338273208	33·1963853	10·3290537	·0009074410
1103	1216609	1341919727	33·2114438	10·3321770	·0009066183
1104	1218816	1345572864	33·2266955	10·3352985	·0009057971
1105	1221025	1349232625	33·2415403	10·3384181	·0009049774
1106	1223236	1352899016	33·2565783	10·3415358	·0009041591
1107	1225449	1356572043	33·2716095	10·3446517	·0009033424
1108	1227664	1360251712	33·2866339	10·3477657	·0009025271
1109	1229881	1363938029	33·3016516	10·3508778	·0009017133
1110	1232100	1367631000	33·3166625	10·3539880	·0009009009
1111	1234321	1371330631	33·3316666	10·3570964	·0009000900
1112	1236544	1375036928	33·3466640	10·3602029	·0008992806
1113	1238769	1378749897	33·3616546	10·3633076	·0008984726
1114	1240996	1382469544	33·3766385	10·3664103	·0008976661
1115	1243225	1386195875	33·3916157	10·3695113	·0008968610
1116	1245456	1389928896	33·4065862	10·3726103	·0008960753
1117	1247689	1393668613	33·4215499	10·3757076	·0008952551
1118	1249924	1397415032	33·4365070	10·3788030	·0008944544
1119	1252161	1401168159	33·4514573	10·3818965	·0008936550
1120	1254400	1404928000	33·4664011	10·3849882	·0008928571
1121	1256641	1408694561	33·4813381	10·3880781	·0008960607
1122	1258884	1412467848	33·4962684	10·3911661	·0008912656
1123	1261129	1416247867	33·5111921	10·3942527	·0008904720
1124	1263376	1420034624	33·5261092	10·3973366	·0008896797
1125	1265625	1423828125	33·5410196	10·4004192	·0008888889
1126	1267876	1427628376	33·5559234	10·4034999	·0008880995
1127	1270129	1431435383	33·5708206	10·4065787	·0008873114
1128	1272384	1435249152	33·5857112	10·4096557	·0008865248
1129	1274641	1439069689	33·6005952	10·4127310	·0008857396
1130	1276900	1442897000	33·6154726	10·4158044	·0008849558
1131	1279161	1446731091	33·6303434	10·4188760	·0008841733
1132	1281424	1450571968	33·6452077	10·4219458	·0008833922
1133	1283689	1454419637	33 6600653	10·4250138	·0008826125
1134	1285956	1458274104	33·6749165	10·4280800	·0008818342
1135	1288225	1462135375	33·6897610	10·4311443	·0008810573
1136	1290496	1466003456	33·7045991	10·4342069	·0008802817
1137	1292769	1469878353	33·7174306	10·4372677	·0008795075

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
1138	1295044	1473760072	33·7340556	10·4403677	·0008787346
1139	1297321	1477648619	33·7490741	10·4433839	·0008779631
1140	1299600	1481544000	33·7638860	10·4464393	·0008771930
1141	1301881	1485446221	33·7786915	10 4494929	·0008764242
1142	1304164	1489355288	33 7934905	10·4525448	·0008756567
1143	1306449	1493271207	33·8082830	10·4555948	·0008748906
1144	1308736	1497193984	33·8230691	10·4586431	·0008741259
1145	1311025	1501123625	33·8378486	10·4616896	·0008733624
1146	1313316	1505060136	33·8526218	10·4647343	·0008726003
1147	1315609	1509003523	33·8673884	10·4677773	·0008718396
1148	1317904	1512953792	33·8821487	10·4708158	·0008710801
1149	1320201	1516910949	33·8969025	10·4738579	·0008703220
1150	1322500	1520875000	33·9116499	10·4768955	·0008695652
1151	1324801	1524845951	33·9263909	10·4799314	·0008688097
1152	1327104	1528823808	33·9411255	10·4829656	·0008680556
1153	1329409	1532808577	33·9558537	10·4859980	·0008673027
1154	1331716	1536800264	33 9705755	10·4890286	·0008665511
1155	1334025	1540798875	33·9852910	10·4920575	·0008658009
1156	1336336	1544804416	34·0000000	10·4950847	·0008650519
1157	1338649	1548816893	34·0147027	10·4981101	·0008643042
1158	1340964	1552836312	34·0293990	10·5011337	·0008635579
1159	1343281	1556862679	34·0440890	10·5041556	·0008628128
1160	1345600	1560896000	34·0587727	10·5071757	·0008620690
1161	1347921	1564936281	34·0734501	10·5101942	·0008613244
1162	1350244	1568983528	34·0881211	10·5132109	·0008605852
1163	1352569	1573037747	34·0127858	10·5162259	·0008598452
1164	1354896	1577098944	34·1174442	10·5192391	·0008591065
1165	1357225	1581167125	34·1320963	10·5222506	·0008583691
1166	1359556	1585242296	34·1467422	10·5252604	·0008576329
1167	1361889	1589324463	34·1613817	10·5282685	·0008568980
1168	1364224	1593413632	34·1760150	10·5312749	·0008561644
1169	1366561	1597509809	34·1906420	10·5342795	·0008554320
1170	1368900	1601613000	34·2052627	10·5372825	·0008547009
1171	1371241	1605723211	34·2198773	10·5402837	·0008539710
1172	1373584	1609840448	34·2344855	10·5432832	·0008532423
1173	1375929	1613964717	34·2490875	10·5462810	·0008525149
1174	1378276	1618096024	34·2636834	10·5492771	·0008517888
1175	1380625	1622234375	34·2782730	10·5522715	·0008510638
1176	1382976	1626379776	34·2928564	10·5552642	·0008503401
1177	1385329	1630532233	34·3074336	10·5582552	·0008496177
1178	1387684	1634691752	34·3220046	10·5612445	·0008488964
1179	1390041	1638858339	34·3365694	10·5642322	·0008481764
1180	1392400	1643032000	34·3511281	10·5672181	·0008471576
1181	1394761	1647212741	34·3656805	10·5702024	·0008467401
1182	1397124	1651400568	34·3802268	10·5731849	·0008460237
1183	1399489	1655595487	34·3947670	10·5761658	·0008453085
1184	1401856	1659797504	34·4093011	10·5791449	·0008445946
1185	1404225	1664006625	34·4238289	10·5821225	·0008438819
1186	1406596	1668222856	34·4383507	10·5850983	·0008431703
1187	1408969	1672446203	34·4528663	10·5880725	·0008424600
1188	1411344	1676676672	34·4673759	10·5910450	·0008417508
1189	1413721	1680914269	34·4818793	10·5940158	·0008410429
1190	1416100	1685159000	34·4963766	10·5969850	·0008403361
1191	1418481	1689410871	34·5108678	10·5999525	·0008396306
1192	1420864	1693669888	34·5253530	10·6029184	·0008389262
1193	1423249	1697936057	34·5398321	10·6058826	·0008382320
1194	1425636	1702209384	34·5543051	10·6088451	·0008375209
1195	1428025	1706489875	34·5687720	10·6118060	·0008368201
1196	1430416	1710777536	34·5832329	10·6147652	·0008361204
1197	1432809	1715072373	34·5976879	10·6177228	·0008354219

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
1198	1435204	1719374392	34·6121366	10·6206788	·0008347245
1199	1437601	1723683599	34·6265794	10·6236331	·0008340284
1200	1440000	1728000000	34·6410162	10·6265857	·0008333333
1201	1442401	1732323601	34·6554469	10·6295367	·0008326395
1202	1444804	1736654408	34·6698716	10·6324860	·0008319468
1203	1447209	1740992427	34·6842904	10·6354338	·0008312552
1204	1449616	1745337664	34·6987031	10·6383799	·0008305648
1205	1452025	1749690125	34·7131099	10·6413244	·0008298755
1206	1454436	1754049816	34·7275107	10·6442672	·0008291874
1207	1456849	1758416743	34·7419055	10·6472085	·0008285004
1208	1459264	1762790912	34·7562944	10·6501480	·0008278146
1209	1461681	1767172329	34·7706773	10·6530860	·0008271299
1210	1464100	1771561000	34·7850543	10·6560223	·0008264463
1211	1466521	1775956931	34·7994253	10·6589570	·0008257638
1212	1468944	1780360128	34·8137904	10·6618902	·0008250825
1213	1471369	1784770597	34·8281495	10·6648217	·0008244023
1214	1473796	1789188344	34·8425028	10·6677516	·0008237232
1215	1476225	1793613375	34 8568501	10·6706799	·0008230453
1216	1478656	1798045696	34·8711915	10·6736066	·0008223684
1217	1481089	1802485313	34·8855271	10 6765317	·0008216927
1218	1483524	1806932232	34·8998567	10·6794552	·0008210181
1219	1485961	1811386459	34·9141805	10·6823771	·0008203445
1220	1488400	1815848000	34·9284984	10·6852973	·0008196721
1221	1490841	1820316861	34·9428104	10·6882160	·0008190008
1222	1493284	1824793048	34·9571166	10·6911331	·0008183306
1223	1495729	1829276567	34·9714169	10·6940486	·0008176615
1224	1498176	1833767424	34·9857114	10·6969625	·0008169935
1225	1500625	1838265625	35·0000000	10·6998748	·0008163265
1226	1503076	1842771176	35·0142828	10·7027855	·0008156607
1227	1505529	1847284083	35·0285598	10·7056947	·0008149959
1228	1507984	1851804352	35·0428309	10·7086023	·0008143322
1229	1510441	1856331989	35·0570963	10·7115083	·0008136696
1230	1512900	1860867000	35·0713558	10·7144127	·0008130081
1231	1515361	1865409391	35·0856096	10·7173155	·0008123477
1232	1517824	1869959168	35·0998575	10·7202168	·0008116883
1233	1520289	1874516337	35·1140997	10·7231165	·0008110300
1234	1522756	1879080904	35·1283361	10·7260146	·0008103728
1235	1525225	1883652875	35·1425568	10·7289112	·0008097166
1236	1527696	1888232256	35·1567917	10·7318062	·0008090615
1237	1530169	1892819053	35·1710108	10·7346997	·0008084074
1238	1532644	1897413272	35·1852242	10·7375916	·0008077544
1239	1535121	1902014919	35·1994318	10·7404819	·0008071025
1240	1537600	1906624000	35·2136337	10·7433707	·0008064516
1241	1540081	1911240521	35·2278299	10·7462579	·0008058018
1242	1542564	1915864488	35·2420204	10·7491436	·0008051530
1243	1545049	1920495907	35·2562051	10·7520277	·0008045052
1244	1547536	1925134784	35·2703842	10·7549103	·0008038585
1245	1550025	1929781125	35·2845575	10·7577913	·0008032129
1246	1552516	1934434936	35·2987252	10·7606708	·0008025682
1247	1555009	1939096223	35·3128872	10·7635488	·0008019246
1248	1557504	1943764992	35·3270435	10·7664252	·0008012821
1249	1560001	1948441249	35·3411941	10·7693001	·0008006405
1250	1562500	1953125000	35·3553391	10·7721735	·0008000000
1251	1565001	1957816251	35·3694784	10·7750453	·0007993605
1252	1567504	1962515008	35·3836120	10·7779156	·0007987220
1253	1570009	1967221277	35·3977400	10·7807843	·0007980846
1254	1572516	1971935064	35·4118624	10·7836516	·0007974482
1255	1575025	1976656375	35 4259792	10·7865173	·0007968127
1256	1577536	1981385216	35·4400903	10·7893815	·0007961783
1257	1580049	1986121593	35·4541958	10·7922441	·0007955449

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
1258	1582564	1990865512	35·4682957	10·7951053	·0007949126
1259	1585081	1995616979	35·4823900	10·7979649	·0007942812
1260	1587600	2000376000	35·4964787	10·8008230	·0007936508
1261	1590121	2055142581	35·5105618	10·8036797	·0007930214
1262	1592644	2009916728	35·5246393	10·8065348	·0007923930
1263	1595166	2014698449	35·5387113	10·8093884	·0007917656
1264	1597696	2019487744	35·5527777	10·8122404	·0007911392
1265	1600225	2024284625	35·5668385	10 8150909	·0007905138
1266	1602756	2029089096	35·5808937	10·8179400	·0007898894
1267	1605289	2033901163	35·5949434	10·8207876	·0007892660
1268	1607824	2038720832	35·6089876	10·8236336	·0007886435
1269	1610361	2043548109	35·6230262	10·8264782	·0007880221
1270	1612900	2048383000	35·6370593	10·8293213	·0007874016
1271	1615441	2053225511	35·6510869	10·8321629	·0007867821
1272	1617984	2058075648	35·6651090	10·8350030	·0007861635
1273	1620529	2062933417	35·6791255	10·8378416	·0007855460
1274	1623076	2067798824	35·6931366	10·8406788	·0007849294
1275	1625625	2072671875	35·7071421	10·8435144	·0007843137
1276	1628176	2075752576	35·7211422	10·8463485	·0007836991
1277	1630729	2082440933	35·7351367	10·8491812	·0007830854
1278	1633284	2087336952	35·7491258	10·8520125	·0007824726
1279	1635841	2092240639	35·7631095	10·8548422	·0007818608
1280	1638400	2097152000	35·7770876	10·8576704	·0007812500
1281	1640961	2102071041	35·7910603	10·8604972	·0007806401
1282	1643524	2106997768	35·8050276	10·8633225	·0007800312
1283	1646089	2111932187	35·8189894	10·8661454	·0007794232
1284	1648656	2116874304	35·8329457	10·8689687	·0007788162
1285	1651225	2121824125	35·8468966	10·8717897	·0007782101
1286	1653796	2126781656	35·8608421	10·8746091	·0007776050
1287	1656369	2131746903	35·8747822	10·8774271	·0007770008
1288	1658944	2136719872	35·8887169	10·8802436	·0007763975
1289	1661521	2141700569	35·9026461	10·8830587	·0007757952
1290	1664100	2146689000	35·9165699	10·8858723	·0007751938
1291	1666681	2151685171	35·9304884	10·8886845	·0007745933
1292	1669264	2156689088	35·9444015	10·8914952	·0007739938
1293	1671849	2161700757	35·9583092	10·8943044	·0007733952
1294	1674436	2166720184	35·9722115	10·8971123	·0007727975
1295	1677025	2171747375	35 9861084	10·8999186	·0007722008
1296	1679616	2176782336	36·0000000	10·9027235	·0007716049
1297	1682209	2181825073	36·0138862	10·9055269	·0007710100
1298	1684804	2186875592	36·0277671	10·9083290	·0007704160
1299	1687401	2191933899	36·0416426	10·9111296	·0007698229
1300	1690000	2197000000	36·0555128	10·9139287	·0007692308
1301	1692601	2202073901	36·0693776	10·9167265	·0007686395
1302	1695204	2207155608	36·0832371	10·9195228	·0007680492
1303	1697809	2212245127	36·0970913	10·9223177	·0007674579
1304	1700416	2217342464	36·1109402	10 9251111	·0007668712
1305	1703025	2222447625	36·1247837	10·9279031	·0007662835
1306	1705636	2227560616	36·1386220	10·9306937	·0007656968
1307	1708249	2232681443	36·1524550	10·9334829	·0007651109
1308	1710864	2237810112	36·1662826	10·9362706	·0007645260
1309	1713481	2242946629	36·1801050	10 9390569	·0007639419
1310	1716100	2248091000	36·1939221	10·9418418	·0007633588
1311	1718721	2253243231	36·2077340	10·9446253	·0007627765
1312	1721344	2258403328	36·2215406	10·9475074	·0007621951
1313	1723969	2263571297	36·2353419	10·9501880	·0007616446
1314	1726596	2268747144	38·2491379	10·9529673	·0007610350
1315	1729225	2273930875	36·2626287	10·9557451	·0007604563
1316	1731856	2279122496	36·2767143	10·9585215	·0007598784
1317	1734489	2284322013	36·2904246	10·9612965	·0007593014

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
1318	1737124	2289529432	36·3042697	10·9640701	·0007587253
1319	1739761	2294744759	36·3180396	10·9668423	·0007581501
1320	1742400	2299968000	36·3318042	10·9696131	·0007575758
1321	1745041	2305199161	36·3455637	10·9723825	·0007570023
1322	1747684	2310438248	36·3593179	10·9751505	·0007564297
1323	1750329	2315685267	36·3730670	10·9779171	·0007558579
1324	1752976	2320940224	36·3868108	10·9806823	·0007552870
1325	1755625	2326203125	36·4005494	10·9834462	·0007547170
1326	1758276	2331473976	36·4142829	10·9862086	·0007541478
1327	1760929	2336752783	36·4280112	10·9889696	·0007535795
1328	1763584	2342039552	36·4417343	10·9917293	·0007530120
1329	1766241	2347334289	36·4554523	10·9944876	·0007524454
1330	1768900	2352637000	36·4691650	10·9972445	·0007518797
1331	1771561	2357947691	36·4828727	11·0000000	·0007513148
1332	1774224	2363266368	36·4965752	11·0027541	·0007507508
1333	1776889	2368593037	36·5102725	11·0055069	·0007501875
1334	1779556	2373927704	36·5239647	11·0082583	·0007496252
1335	1782225	2379270375	36·5376518	11·0110082	·0007490637
1336	1784896	2384621056	36·5513388	11·0137569	·0007485030
1337	1787569	2389979753	36·5650106	11·0165041	·0007479432
1338	1790244	2395346472	36·5786823	11·0192500	·0007473842
1339	1792921	2400721219	36·5923489	11·0219945	·0007468260
1340	1795600	2406104000	36·6060104	11·0247377	·0007462687
1341	1798281	2411494821	36·6196668	11·0274795	·0007457122
1342	1800964	2416893688	36·6333181	11·0302199	·0007451565
1343	1803649	2422300607	36·6469144	11·0329590	·0007446016
1344	1806336	2427715584	36·6606056	11·0356967	·0007440476
1345	1809025	2433138625	36·6742416	11·0384330	·0007434944
1346	1811716	2438569736	36·6878726	11·0411680	·0007429421
1347	1814409	2444008923	36·7014986	11·0439017	·0007423905
1348	1817104	2449456192	36·7151195	11·0466339	·0007418398
1349	1819801	2454911549	36·7287353	11·0493649	·0007412898
1350	1822500	2460375000	36·7423461	11·0520945	·0007407407
1351	1825201	2465846551	36·7559519	11·0548227	·0007401924
1352	1827904	2471326208	36·7695526	11·0575497	·0007396450
1353	1830609	2476813977	36·7831483	11·0602752	·0007390983
1354	1833316	2482309864	36·7967390	11·0629994	·0007385524
1355	1836025	2487813875	36·8103246	11·0657222	·0007380074
1356	1838736	2493326016	36·8239053	11·0684437	·0007374631
1357	1841449	2498846293	36·8374809	11·0711639	·0007369197
1358	1844164	2504374712	36·8510515	11·0738828	·0007363770
1359	1846881	2509911279	36·8646172	11·0766003	·0007358352
1360	1849600	2515456000	36·8781778	11·0793165	·0007352941
1361	1852321	2521008881	36·8917335	11·0820314	·0007347539
1362	1855044	2526569928	36·9052842	11·0847449	·0007342144
1363	1857769	2532139147	36·9188299	11·0874571	·0007336757
1364	1860496	2537716544	36·9323706	11·0901679	·0007331378
1365	1863225	2543302125	36·9459064	11·0928775	·0007326007
1366	1865956	2548895896	36·9594372	11·0955857	·0007320644
1367	1868689	2554497863	36·9729631	11·0982926	·0007315289
1368	1871424	2560108032	36·9864840	11·1009982	·0007309942
1369	1874161	2565726409	37·0000000	11·1037025	·0007304602
1370	1876900	2571353000	37·0135110	11·1064054	·0007299270
1371	1879641	2576987811	37·0270172	11·1091070	·0007293946
1372	1882384	2582630848	37·0405184	11·1118073	·0007288630
1373	1885129	2588282117	37·0540146	11·1145064	·0007283321
1374	1887876	2593941624	37·0675060	11·1172041	·0007278020
1375	1890625	2599609375	37·0899924	11·1199004	·0007272727
1376	1893376	2605285376	37·0944740	11·1225955	·0007267442
1377	1896129	2610969633	37·1079506	11·1252893	·0007262164

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
1378	1898884	2616662152	37·1214224	11·1279817	·0007256894
1379	1901641	2622362939	37·1348893	11·1306729	·0007251632
1380	1904400	2628072000	37·1483512	11·1333628	·0007246377
1381	1907161	2633789341	37·1618084	11·1360514	·0007241130
1382	1909924	2639514968	37·1752606	11·1387386	·0007235890
1383	1912689	2645248887	37·1887079	11·1414246	·0007230658
1384	1915456	2650991104	37·2021505	11·1441093	·0007225434
1385	1918225	2656741625	37·2155881	11·1467926	·0007220217
1386	1920996	2662500456	37·2290209	11·1494747	·0007215007
1387	1923769	2668267603	37·2424489	11·1521555	·0007209805
1388	1926544	2674043072	37·2558720	11·1548350	·0007204611
1389	1929321	2679826869	37·2692903	11·1575133	·0007199424
1390	1932100	2685619000	37·2827037	11·1601903	·0007194245
1391	1934881	2691419471	37·2961124	11·1628659	·0007189073
1392	1937664	2697228288	37·3095162	11·1655403	·0007183908
1393	1940449	2703045457	37·3229152	11·1682134	·0007178751
1394	1943236	2708870984	37·3363094	11·1708852	0007173601
1395	1946025	2714704875	37·3496988	11·1735558	·0007168459
1396	1948816	2720547136	37·3630834	11·1762250	·0007163324
1397	1951609	2726397773	37·3764632	11·1788930	·0007158196
1398	1954404	2732256792	37·3898382	11·1815598	·0007153076
1399	1957201	2738124199	37·4032084	11·1842252	·0007147963
1400	1960000	2744000000	37·4165738	11·1868894	·0007142857
1401	1962801	2749884201	37·4299345	11·1895523	·0007137759
1402	1965604	2755776808	37·4432904	11·1922139	·0007132668
1403	1968409	2761677827	37·4566416	11·1948743	·0007127584
1404	1971216	2767587264	37·4699880	11·1975334	·0007122507
1405	1974025	2773505125	37·4833296	11·2001913	·0007117438
1406	1976836	2779431416	37·4966665	11·2028479	·0007112376
1407	1979649	2785366143	37·5099987	11·2055032	·0007107321
1408	1982464	2791309312	37·5233261	11·2081573	·0007102273
1409	1985281	2797260929	37·5366487	11·2108101	·0007097232
1410	1988100	2803221000	37·5499667	11·2134617	·0007092199
1411	1990921	2809189531	37·5632799	11·2161120	·0007087172
1412	1993744	2815166528	37·5765885	11·2187611	·0007082153
1413	1996569	2821151997	37·5898922	11·2214089	·0007077141
1414	1999396	2827145944	37·6031913	11·2240054	·0007072136
1415	2002225	2833148375	37·6164857	11·2267007	·0007067138
1416	2005056	2839159296	37·6297754	11·2293448	·0007062147
1417	2007889	2845178713	37·6430604	11·2319876	·0007057163
1418	2010724	2851206632	37·6563407	11·2346292	·0007052186
1419	2013561	2857243059	37·6696164	11·2372696	·0007047216
1420	2016400	2863288000	37·6828874	11·2399087	·0007042254
1421	2019241	2869341461	37·6961536	11·2425465	·0007037298
1422	2022084	2875403448	37·7094153	11·2451831	·0007032349
1423	2024929	2881473967	37·7226722	11·2478185	·0007027407
1424	2027776	2887553024	37·7359245	11·2504527	·0007022472
1425	·2030625	2893640625	37·7491722	11·2530856	·0007017544
1426	2033476	2899736776	37·7624152	11·2557173	·0007012623
1427	2036329	2905841483	37·7756535	11·2583478	·0007007708
1428	2039184	2911954752	37·7888873	11·2609770	·0007002801
1429	2042041	2918076589	37·8021163	11·2636050	·0006997901
1430	2044900	2924207000	37·8153408	11·2662318	·0006993007
1431	2047761	2930345991	37·8285606	11·2688573	·0006988120
1432	2050624	2936493568	37·8417759	11·2714816	·0006983240
1433	2053489	2942649737	37·8549864	11·2741047	·0006978367
1434	2056356	2948814504	37·8681924	11·2767266	·0006973501
1435	2059225	2954987875	37·8813938	11·2793472	·0006968641
1436	2062096	2961169856	37·8945906	11·2819666	·0006963788
1437	2064969	2967360453	37·9077828	11·2845849	·0006958942

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
1438	2067844	2973559672	37·9209704	11·2872019	·0006954103
1439	2070721	2979767519	37·9341538	11·2898177	·0006949270
1440	2073600	2985984000	37·9473319	11·2924323	·0006944444
1441	2076481	2992209121	37·9605058	11·2950457	·0006939625
1442	2079364	3098442888	37·9736751	11·2976579	·0006984813
1443	2082249	3004685307	37·9868398	11·3002688	·0006930007
1444	2085136	3010936384	38·0000000	11·3028786	·0006925208
1445	2088025	3017196125	38·0131556	11·3054871	·0006920415
1446	2080916	3023464536	38·0263067	11·3080945	·0006915629
1447	2093809	3029741623	38·0394532	11·3107006	·0006910850
1448	2096704	3036027392	38·0525952	11·3133056	·0006906078
1449	2099601	3042321849	38·0657326	11·3159094	·0006901312
1450	2102500	3048625000	38·0788655	11·3185119	·0006896552
1451	2105401	3054936851	38·0919939	11·3211132	·0006891799
1452	2108304	3061257408	38·1051178	11·3237134	·0006887052
1453	2111209	3067586677	38·1182371	11·3263124	·0006882312
1454	2114116	3073924664	38·1313519	11·3289102	·0006877579
1455	2117025	3080271375	38·1444622	11·3315067	·0006872852
1456	2119936	3086626816	38·1575681	11·3341022	·0006868132
1457	2122849	3092990993	38·1706693	11·3366964	·0006863412
1458	2125764	3099363912	38·1837662	11·3392894	·0006858711
1459	2128681	3105745579	38·1968585	11·3418813	·0006854010
1460	2131600	3112136000	38·2099463	11·3444719	·0006849315
1461	2134521	3118535181	38·2230297	11·3470614	·0006844627
1462	2137444	3124943128	38·2361085	11·3496497	·0006839945
1463	2140369	3131359847	38·2491829	11·3522368	·0006835270
1464	2143296	3137785344	38·2622529	11·3548227	·0006830601
1465	2146225	3144219625	38·2753184	11·3574075	·0006825939
1466	2149156	3150662696	38·2883794	11·3599911	·0006821282
1467	2152089	3157114563	38·3014360	11·3625735	·0006816633
1468	2155024	3163575232	38·3144881	11·3651547	·0006811989
1469	2157961	3170044709	38·3275358	11·3677347	·0006807352
1470	2160900	3176523000	38·3405790	11·3703136	·0006802721
1471	2163841	3183010111	38·3536178	11·3728914	·0006798097
1472	2166784	3189506048	38·3666522	11·3754679	·0006793478
1473	2169729	3196010817	38·3796821	11·3780433	·0006788866
1474	2172676	3202524424	38·3927076	11·3806175	·0006784261
1475	2175625	3209046875	38·4057287	11·3831906	·0006779661
1476	2178576	3215578176	38·4187454	11·3857625	·0006775068
1477	2181529	3222118333	38·4317577	11·3883332	·0006770481
1478	2184484	3228667352	38·4447656	11·3909028	·0006765900
1479	2187441	3235225239	38·4577691	11·3934712	·0006761325
1480	2190400	3241792000	38·4707681	11·3960384	·0006756757
1481	2193361	3248367641	38·4837627	11·3986045	·0006752194
1482	2196324	3254952168	38·4967530	11·4011695	·0006747638
1483	2199289	3261545587	38·5097390	11·4037332	·0006743088
1484	2202256	3268147904	38·5227206	11·4062959	·0006738544
1485	2205225	3274759125	38·5356977	11·4088574	·0006734007
1486	2208196	3281379256	38·5486705	11·4114177	·0006729474
1487	2211169	3288008303	38·5616389	11·4139769	·0006724950
1488	2214144	3294646272	38·5746030	11·4165349	·0006720430
1489	2217121	3301293169	38·5875627	11·4190918	·0006715917
1490	2220100	3307949000	38·6005181	11·4206476	·0006711409
1491	2223081	3314613771	38·6134691	11·4242022	·0006706908
1492	2226064	3321287488	38·6264158	11·4267556	·0006702413
1493	2229049	3327970157	38·6393582	11·4293079	·0006697924
1494	2232036	3334661784	38·6522962	11·4318591	·0006693440
1495	2235025	3341362375	38·6652299	11·4344092	·0006688963
1496	2238016	3348071936	38·6781593	11·4369581	·0006684492
1497	2241009	3354790473	38·6910843	11·4395059	·0006680027

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
1498	2244004	3361517992	38·7040050	11·4420525	·0006675567
1499	2247001	3368254499	38·7169214	11·4445980	·0006671114
1500	2250000	3375000000	38·7298335	11·4471424	·0006666667
1501	2253001	3381754501	38·7427412	11·4496857	·0006662225
1502	2256004	3388518008	38·7556447	11·4522278	·0006657790
1503	2259009	3395290527	38·7685439	11·4547688	·0006653360
1504	2262016	3402072064	38·7814389	11·4573087	·0006648936
1505	2265025	3408862625	38·7943294	11·4598476	·0006644518
1506	2268036	3415662216	38·8072158	11·4623850	·0006640106
1507	2271049	3422470843	38·8200978	11·4649215	·0006635700
1508	2274064	3429288512	38·8329757	11·4674568	·0006631300
1509	2277081	3436115229	38·8458491	11·4699911	·0006626905
1510	2280100	3442951000	38·8587184	11·4725242	·0006622517
1511	2283121	3449795831	38·8715834	11·4750562	·0006618134
1512	2286144	3456649728	38·8844442	11·4775871	·0006613757
1513	2289169	3463512697	38·8973006	11·4801169	·0006609385
1514	2292196	3470384744	38·9101529	11·4826455	·0006605020
1515	2295225	3477265875	38·9230009	11·4851731	·0006600660
1516	2298256	3484156096	38·9358447	11·4876995	·0006596306
1517	2301289	3491055413	38·9486841	11·4902249	·0006591958
1518	2304324	3597963832	38·9615194	11·4927491	·0006587615
1519	2307361	3504881359	38·9743505	11·4952722	·0006583278
1520	2310400	3511808000	38·9871774	11·4977942	·0006578947
1521	2313441	3518743761	39·0000000	11·5003151	·0006574622
1522	2316484	3525688648	39·0128184	11·5028348	·0006570302
1523	2319529	3532642667	39·0256326	11·5053535	·0006565988
1524	2322576	3539605824	39·0384426	11·5078711	·0006561680
1525	2325625	3546578125	39·0512483	11·5103876	·0006557377
1526	2328676	3553559576	39·0640499	11·5129030	·0006553080
1527	2331729	3560550183	39·0768473	11·5154173	·0006548788
1528	2334784	3567549952	39·0896406	11·5179305	·0006544503
1529	2337841	3574558889	39·1024296	11·5204425	·0006540222
1530	2340900	3581577000	39·1152144	11·5229535	·0006535948
1531	2343961	3588604291	39·1279951	11·5254634	·0006531679
1532	2347024	3595640768	39·1407716	11·5279722	·0006527415
1533	2350089	3602686437	39·1535439	11·5304799	·0006523157
1534	2353156	3609741304	39·1663120	11·5329865	·0006518905
1535	2356225	3616805375	39·1790760	11·5354920	·0006514658
1536	2359296	3623878656	39·1918359	11·5379965	·0006510417
1537	2362369	3630961153	39·2045915	11·5404998	·0006506181
1538	2365444	3638052872	39·2173431	11·5430021	·0006501951
1539	2368521	3645153819	39·2300905	11·5455033	·0006497726
1540	2371600	3652264000	39·2428337	11·5480034	·0006493506
1541	2374681	3659383421	39·2555728	11·5505025	·0006489293
1542	2377764	3666512088	39·2683078	11·5530004	·0006485084
1543	2380849	3673650007	39·2810387	11·5554972	·0006480881
1544	2383936	3680797184	39·2937654	11·5579931	·0006476684
1545	2387025	3687953625	39·3064880	11·5604878	·0006472492
1546	2390116	3695119336	39·3192065	11·5629815	·0006468305
1547	2393209	3702294323	39·3319208	11·5654740	·0006464124
1548	2396304	3709478592	39·3446311	11·5679655	·0006459948
1549	2399401	3716672149	39·3573373	11·5704559	·0006455778
1550	2402500	3723875000	39·3700394	11·5729453	·0006451613
1551	2405601	3731087151	39·3827373	11·5754336	·0006447453
1552	2408704	3738308608	39·3954312	11·5779208	·0006443299
1553	2411809	3745539377	39·4081210	11·5804069	·0006439150
1554	2414916	3752779464	39·4208067	11·5828919	·0006435006
1555	2418025	3760028875	39·4334883	11·5853759	·0006430868
1556	2421136	3767287616	39·4461658	11·5878588	·0006426735
1557	2424249	3774555693	39·4588393	11·5903407	·0006422608

Numbers.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
1558	2427364	3781833112	39·4715087	11·5928215	·0006418485
1559	2430481	3789119879	39·4841740	11·5953013	·0006414368
1560	2433600	3796416000	39·4968353	11·5977799	·0006410256
1561	2436721	3803721481	39·5094925	11·6002576	·0006406150
1562	2439844	3811036328	39·5221457	11·6027342	·0006402049
1563	2442969	3818360547	39·5347948	11·6052097	·0006397953
1564	2446096	3825694144	39·5474399	11·6076841	·0006393862
1565	2449225	3833037125	39·5600809	11·6101575	·0006389776
1566	2452356	3840389496	39·5727179	11·6126299	·0006385696
1567	2455489	3847751263	39·5853508	11·6151012	·0006381621
1568	2458624	3855122432	39·5979797	11·6175715	·0006377551
1569	2461761	3862503009	39·6106046	11·6200407	·0006373486
1570	2464900	3869883000	39·6232255	11·6225088	·0006369427
1571	2468041	3877292411	39·6358424	11·6249759	·0006365372
1572	2471184	3884701248	39·6484552	11·6274420	·0006361323
1573	2474329	3892119517	39·6610640	11·6299070	·0006357279
1574	2477476	3899547224	39·6736688	11·6323710	·0006353240
1575	2480625	3906984375	39·6862696	11·6348339	·0006349206
1576	2483776	3914430976	39·6988665	11·6372957	·0006345178
1577	2486929	3921887033	39·7114593	11·6397566	·0006341154
1578	2490084	3929352552	39·7240481	11·6422164	·0006337136
1579	2493241	3936827539	39·7366329	11·6446751	·0006333122
1580	2496400	3944312000	39·7492138	11·6471329	·0006329114
1581	2499561	3951805941	39·7617907	11·6495895	·0006325111
1582	2502724	3959309368	39·7743636	11·6520452	·0006321113
1583	2505889	3966822287	39·7869325	11·6544998	·0006317119
1584	2509056	3974344704	39·7994976	11·6569534	·0006313131
1585	2512225	3981876625	39·8120585	11·6594059	·0006309148
1586	2515396	3989418056	39·8246155	11·6618574	·0006305170
1587	2518569	3996969003	39·8371686	11·6643079	·0006301197
1588	2521744	4004529472	39·8497177	11·6667574	·0006297229
1589	2524921	4012099469	39·8622628	11·6692058	·0006293266
1590	2528100	4014679000	39·8748040	11·6716532	·0006289308
1591	2531281	4027268071	39·8873413	11·6740996	·0006285355
1592	2534464	4034866688	39·8998747	11·6765449	·0006281407
1593	2537649	4042474857	39·9124041	11·6789892	·0006277464
1594	2540836	4950092584	39·9249295	11·6814325	·0006273526
1595	2544025	4057719875	39·9374511	11·6838748	·0006269592
1596	2547216	4065356736	39·9499687	11·6863161	·0006265664
1597	2550409	4073003173	39·9624824	11·6887563	·0006261741
1598	2553604	4080659192	39·9749922	11·6911955	·0006257822
1599	2556801	4088324799	39·9874980	11·6936337	·0006253909
1600	2560000	4096000000	40·0000000	11·6960709	·0006250000

To Find the Square or Cube Root of a Number consisting of Integers and Decimals.

Multiply the difference between the root of the integer part of the given number, and the root of the next higher integer number, by the decimal part of the given number, and add the product to the root of the given integer number; the sum is the root required.

Example.—Required the square root of 20·321.

Square root of 21 = 4·5825
Do. 20 = 4·4721

·1104 × ·321 + 4·4721 = 4·5075384, the sq. root required.

Required the cube root of 16·42.

Cube root of 2 5712
Do. 2·5198

·0514 × ·42 + 2·5198 = 2·541388, the cube root required.

TABLE OF THE FOURTH AND FIFTH POWERS OF NUMBERS.

Number.	4th Power.	5th Power.	Number.	4th Power.	5th Power.
1	1	1	59	12117361	714924299
2	16	32	60	12960000	777600000
3	81	243	61	13845841	844596301
4	256	1024	62	14776336	916132832
5	625	3125	63	15752961	992436543
6	1296	7776	64	16777216	1073741824
7	2401	16807	65	17850625	1160290625
8	4096	32768	66	18974736	1252332576
9	6561	59049	67	20151121	1350125107
10	10000	100000	68	21381376	1453933568
11	14641	161051	69	22667121	1564031349
12	20736	248832	70	24010000	1680700000
13	28561	371293	71	25411681	1804229351
14	38416	537824	72	26873856	1934917632
15	50625	759375	73	28398241	2073071593
16	65536	1048576	74	29986576	2219006624
17	83521	1419857	75	31640625	2373046875
18	104976	1889568	76	33362176	2535525376
19	130321	2476099	77	35153041	2706784157
20	160000	3200000	78	37015056	2887174368
21	194481	4084101	79	38950081	3077056399
22	234256	5153632	80	40960000	3276800000
23	279841	6436343	81	43046721	3486784401
24	331776	7962624	82	45212176	3707398439
25	390625	9765625	83	47458321	3939040643
26	456976	11881376	84	49787136	4182119424
27	531441	14348907	85	52200625	4437053125
28	614656	17210368	86	54708016	4704270176
29	707281	20511149	87	57289761	4984209207
30	810000	24300000	88	59969536	5277319168
31	923521	28629151	89	62742241	5584059449
32	1048576	33554432	90	65610000	5904900000
33	1185921	39135393	91	68574961	6240321451
34	1336336	45435424	92	71639296	6590815232
35	1500625	52521875	93	74805201	6596883693
36	1679616	60466176	94	78074896	7339040224
37	1874161	69343957	95	81450625	7737809375
38	2085136	79235168	96	84934656	8153726976
39	2313441	90224199	97	88529281	8587340257
40	2560000	102400000	98	92236816	9039207968
41	2825761	115856201	99	96059601	9509900499
42	3111696	130691232	100	100000000	10000000000
43	3418801	147008443	101	104060401	10510100501
44	3748096	164916224	102	108243216	11040808032
45	4100625	184528125	103	112550881	11592740743
46	4477456	205962976	104	116985856	12166529024
47	4879681	229345007	105	121550625	12762815625
48	5308416	254803968	106	126247696	13382255776
49	5764801	282475249	107	131079601	14025517307
50	6250000	312500000	108	136048896	14693280768
51	6765201	345025251	109	141158161	15386239549
52	7311616	380204032	110	146410000	16105100000
53	7890481	418195493	111	151807041	16850591551
54	8503056	459165024	112	157351936	17623416832
55	9150625	503284375	113	163047361	18424351793
56	9834496	550731776	114	168896016	19254145824
57	10556001	601692057	115	174900625	20113571875
58	11316496	656356768	116	181063936	21003416576

Number.	4th Power.	5th Power.	Number.	4th Power.	5th Power.
117	187388721	21924480357	134	322417936	43204003424
118	193877776	22877577568	135	332150625	44840334375
119	200533921	23863536599	136	342102016	56525874176
120	207360000	24883200000	137	352275361	48261724457
121	214358881	25937424601	138	362673936	50049003168
122	221533456	27027081632	139	373301641	51888844699
123	228886641	28153056843	140	384160000	53782400000
124	236421376	29316250624	141	395254161	55730836701
125	244140625	30517578125	142	406586896	57735339232
126	252047376	31757969376	143	418161601	59797108943
127	260144641	33038369407	144	429981696	61917364224
128	268435456	34359738368	145	442050625	64097340625
129	276922881	35723051649	146	454371856	66338290976
130	285610000	37129300000	147	466948881	68641485507
131	294499921	38579489651	148	479785216	71008211968
132	303595776	40074642432	149	492884401	73439775749
133	312900721	41615795893	150	506250000	75937500000

TABLE OF COLOURS

Used in Architectural and Mechanical Drawing.

Work.	Colour.
Brickwork in plan or section	Carmine or crimson lake.
Brickwork in elevation	Venetian red.
Brickwork to be removed by alterations, flint-work, or lead	Prussian blue.
Concrete works, stone	Sepia.
Clay, earth	Burnt umber.
Granite	Purple madder.
English timber (oak excepted)	Raw sienna.
Oak, teak	Burnt sienna.
Fir, and most other timber	Indian yellow.
Mahogany	Indian red.
Cast iron, and wrought iron in the rough. . .	Payne's grey.
Wrought iron (bright)	Indigo.
Steel (bright)	Indigo, with a little lake.
Brass	Gamboge.
Gun-metal	Dark cadmium.
Meadow land	Hooker's green.
Sky effects	Cobalt blue.

The presence of any slight greasiness, preventing the laying on of the colours evenly, may be counteracted in its effects by dissolving a little prepared ox-gall in the water with which the colours are mixed.

COST OF GAS-WORKS, POPULATION PER MILE, ETC.

The average cost of gas-works in provincial towns is about £1 per head of the population. In very large towns it will amount to more, and in small towns it will not reach that sum.

The average cost of gas-works per million cubic feet of gas produced per annum is from £700 to £800.

The population per mile of main is usually about 2000 people. In densely populated towns it will rise to 3000; but in fashionable places, where the houses stand more apart, the population per mile of main will fall below 1000.

The average consumption per head of the population in large towns is about 2500 cubic feet per annum; in small towns, about 1800 cubic feet per head per annum.

The average consumption of gas per mile of main is from 2¼ to 2½ millions of cubic feet per annum.

GOLDEN RULES FOR GAS MANAGERS.

KEEP UP THE HEATS OF THE RETORTS.

KEEP UP THE WATER IN THE METERS.

KEEP DOWN THE PRESSURE IN THE MAINS DURING THE DAYTIME.

KEEP DOWN THE ARREARS IN THE GAS LEDGER.

STRUCTURAL AND COMMERCIAL VALUE.

The term "Structural Value" has reference to the amount of capital expended upon works in their construction.

"Commercial Value" is the value of the net annual average profits, reckoned on a number of years, which a firm or company can make by the use of their works.

GAS ENGINEERS' CHARGES.

The lowest charge of a gas engineer for professional services rendered is three guineas per day.

OFFICE MEMORANDA.

Collector.

A good collector will deliver, on an average, 400 gas bills per day.

Books required in the Keeping of a Gas Company's Accounts.

1. Ledger (general).
2. Cash Book (general).
3. Gas Register, or Ledger, sometimes called "The Consumers' Ledger."*
4. Mill Register, or Ledger.

   This book is devoted to the accounts of all the largest consumers, such as millowners, and the proprietors of other large establishments of any kind where the consumption of gas is heavy. They are handier classed together by themselves, than mixed up with smaller consumers.
5. Removals Book.

   In this book is kept an account of all changes of residence that have taken place amongst consumers during each quarter, the substitution of meters, and the consumption of gas by temporary consumers, &c. It is a most useful record, and prevents confusion by interlineations in the regular register.

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* A detailed description of this book is given in the second report of the Transactions of the British Association of Gas Managers, 1865.

6. **Quarterly Summary.**

The several pages in the three foregoing books are added up, and then brought together here, quarterly, in order to ascertain the total consumption, amount due, &c. By means of this book it is easy to compare the totals of the different quarters during a number of years.

7. **Journal.**

Containing entries of all goods sold from the works, with the exception of gas. Separate columns should be arranged for "Fittings, &c," "Residual Products," "Miscellaneous" and "Total." At the end of each quarter the separate amounts of all accounts remaining unpaid are transferred to the

8. **Arrears, Fittings, &c., Book.**

Which is entered up at the end of every quarter, and shows the amount remaining due (arrears included) for fittings, residual products, and miscellaneous.

9. **Daily Receipt (Cash) Book.**

In which are entered the amount of each separate payment made to the company on account of "Gas," "Meter-Rents," "Fittings, &c.," "Residual Products," and other miscellaneous items.

10. **Stock-Taking Books.**

For taking the quarterly stock of gas consumed through each meter. Two or more are always required, according to the size of the company. The one used (we will suppose) on Monday is left at the office that night to be entered up into the register, by the clerk, on the day following; and so on, alternately.

11. **Collector's Book.**

In some companies, checks only are used, with counterfoil.

12. **Receiving Book.**

In which all delivery notes for goods received by the company are copied daily. The regular invoice, when received, is checked by this book.

13. **Wages and Time Book.**

Containing, in separate columns, a daily account of the number of hours worked by each man, the kind of work, and the place where employed, with the amount due as wages at the end of each week or fortnight, as the case may be.

14. **Stores Book, A.**

15. **Stores Book, B.**

In the one is kept a record of goods *sold* out of stock, and in the other of goods *used* out of stock for *repairs and extensions of plant.* The one may be said to relate to *revenue*, the other chiefly to *capital.*

16. **Stores Ledger.**

Into which the entries in the previous two books are posted to the *credit* of the several accounts (such as "Meters," "Lead Pipe," "Wrought-Iron Fittings," &c.), and the items from the several invoices are posted to the *debit* of the several accounts. At the end of each half year the balance of each account represents the stock on hand. This latter is proved to be correct or otherwise by the result of the actual stock-taking.

17. **Daily and Weekly Statements.**

    Contain a record of the state of the station-meter taken twice in the 24 hours (in some very large works, the state of the meter is recorded every hour); the quantity of coal and cannel used daily, the production of gas per ton, and the total daily production; the number of ovens at work, stokers, &c. Each page serves for a week, and is then added up; an additional line is left at the foot of the page, on which is entered the particulars of the corresponding week of the previous year.

18. **Public Lamp Register.**

    Gives particulars of the number of lamps lighted each night; the hours of lighting and extinguishing; the hours burning per lamp, the total hours burning; a column into which the number of hours, weekly, can be added, and another for remarks.

19. **Test Register.**

    For noting the results of the different tests of the illuminating power and purity of the gas.

20. **Shareholders' Register and Address Book.**

21. **Seal Register and Dividend List.**

22. **Register of Calls.**

23. **Register of Transfers.**

24. **Transfer Certificate Book.**

    Containing certificates of the registration of shares, to be torn out, leaving counterfoil behind.

25. **Invoice Book.**

    With blank leaves, into which are gummed all invoices for goods received.

26. **Minute Book.**

    A lettered index at the beginning of this book is handy.

A few other account-books of a less important character may be useful, but the above may be said to be almost indispensable in a well-regulated gas company.

TABLE

Showing the Cost of Gas per Hour in Fractions of a Penny, when Burnt at the Following Rates per 1000 *Cubic Feet :—*

Consumption per Hour in Cubic Feet.	2s. 6d.	2s. 7d.	2s. 8d.	2s. 9d.	2s.10d.	2s.11d.	3s. 0d.	3s. 1d.	3s. 2d.	3s. 3d.	3s. 4d.	3s. 5d.
2	·060	·062	·064	·066	·068	·070	·072	·074	·076	·078	·080	·082
2½	·075	·0775	·080	·0825	·085	·0875	·090	·0952	·095	·0975	·100	·1025
3	·090	·093	·096	·099	·102	·105	·108	·111	·114	·117	·120	·123
3½	·105	·1085	·112	·1155	·119	·1225	·126	·1295	·133	·1365	·140	·1435
4	·120	·124	·128	·132	·136	·140	·144	·148	·152	·156	·160	·164
4½	·135	·1395	·144	·1485	·153	·1575	·162	·1665	·171	·1755	·180	·1845
5	·150	·155	·160	·165	·170	·175	·180	·185	·190	·195	·200	·205
5½	·165	·1705	·176	·1815	·187	·1925	·198	·2035	·209	·2145	·220	·2255
6	·180	·186	·192	·198	·204	·210	·216	·222	·228	·234	·240	·246
6½	·195	·2015	·208	·2145	·221	·2275	·234	·2405	·247	·2535	·260	·2665
7	·210	·217	·224	·231	·238	·245	·252	·259	·266	·273	·280	·287

Cost of Gas per Hour in Fractions of a Penny—continued.

Consumption per Hour in Cubic Feet.	3s. 6d.	3s. 7d.	3s. 8d.	3s. 9d.	3s.10d.	3s.11d.	4s. 0d.	4s. 1d.	4s. 2d.	4s. 3d.	4s. 4d.	4s. 5d.
2	·084	·086	·088	·090	·092	·094	·096	·098	·100	·102	·104	·106
2½	·105	·1075	·110	·1125	·115	·1175	·120	·1225	·125	·1275	·130	·1325
3	·126	·129	·132	·135	·138	·141	·144	·147	·150	·153	·156	·159
3½	·147	·1505	·154	·1575	·161	·1645	·168	·1715	·175	·1785	·182	·1855
4	·168	·172	·176	·180	·184	·188	·192	·196	·200	·204	·208	·212
4½	·189	·1935	·198	·2025	·207	·2115	·216	·2205	·225	·2295	·234	·2385
5	·210	·215	·220	·225	·230	·235	·240	·245	·250	·255	·260	·265
5½	·231	·2365	·242	·2475	·253	·2585	·264	·2695	·275	·2805	·286	·2915
6	·252	·258	·264	·270	·276	·282	·288	·294	·300	·306	·312	·318
6½	·273	·2795	·286	·2925	·299	·3055	·312	·3185	·325	·3315	·338	·3445
7	·294	·301	·308	·315	·322	·329	·336	·343	·350	·357	·364	·371

Consumption per Hour in Cubic Feet.	4s. 6d.	4s. 7d.	4s. 8d.	4s. 9d.	4s.10d.	4s.11d.	5s. 0d.	5s. 1d.	5s. 2d.	5s. 3d.	5s. 4d.	5s. 5d.
2	·108	·110	·112	·114	·116	·118	·120	·122	·124	·126	·128	·130
2½	·135	·1375	·140	·1425	·145	·1475	·150	·1525	·155	·1575	·160	·1625
3	·162	·165	·168	·171	·174	·177	·180	·183	·186	·189	·192	·195
3½	·189	·1925	·196	·1995	·203	·2065	·210	·2135	·217	·2205	·224	·2275
4	·216	·220	·224	·228	·232	·236	·240	·244	·248	·252	·256	·260
4½	·243	·2475	·252	·2565	·261	·2655	·270	·2745	·279	·2835	·288	·2925
5	·270	·275	·280	·285	·290	·295	·300	·305	·310	·315	·320	·325
5½	·297	·3025	·308	·3135	·319	·3245	·330	·3355	·341	·3465	·352	·3575
6	·324	·330	·336	·342	·348	·354	·360	·366	·372	·378	·384	·390
6½	·351	·3575	·364	·3705	·377	·3835	·390	·3965	·403	·4095	·416	·4225
7	·378	·385	·392	·399	·406	·413	·420	·427	·434	·441	·448	·455

Consmp. per Hour in Cb. Ft.	5s. 6d.	5s. 7d.	5s. 8d.	5s. 9d.	5s.10d.	5s.11d.	6s. 0d.	6s. 1d.	6s. 2d.	6s. 3d.	6s. 4d.	6s. 5d.	6s. 6d.
2	·132	·134	·136	·138	·140	·142	·144	·146	·148	·150	·152	·154	·156
2½	·165	·1675	·170	·1725	·175	·1775	·180	·1825	·185	·1875	·190	·1925	·195
3	·198	·201	·204	·207	·210	·213	·216	·219	·222	·225	·228	·231	·234
3½	·231	·2345	·238	·2415	·245	·2485	·252	·2555	·259	·2625	·266	·2695	·273
4	·264	·268	·272	·276	·280	·284	·288	·292	·296	·300	·304	·308	·312
4½	·297	·3015	·306	·3105	·315	·3195	·324	·3285	·333	·3375	·342	·3465	·351
5	·330	·335	·340	·345	·350	·355	·360	·365	·370	·375	·380	·385	·390
5½	·363	·3685	·374	·3795	·385	·3905	·396	·4015	·407	·4125	·418	·4235	·429
6	·396	·402	·408	·414	·420	·426	·432	·438	·444	·450	·456	·462	·468
6½	·429	·4355	·442	·4485	·455	·4615	·468	·4745	·481	·4875	·494	·5005	·507
7	·462	·469	·476	·483	·490	·497	·504	·511	·518	·525	·532	·539	·546

FORMS.

Renouncement of Proposed New Shares on the Transfer of Old Stock.

I, John Thompson, of Tipping Street, Newcastle, hereby renounce my right to any of the new shares about to be issued by the ——— Gas Company, in favour of William Jones, of Broad Street, Manchester.

(Signed)

JOHN THOMPSON,
Jan. 1, 1870.

To the Secretary
of the ——— Gas Company.

Renunciation of Shares newly Allotted.

I, John Wilson, of Birmingham, being the holder [*or* proprietor] of ——— shares in the ——— Gas Company, do hereby renounce the same to and in favour of of William Jackson of Bristol. And I the said William Jackson, hereby agree to accept and take the said shares, subject to the conditions on which they are allotted. Dated this —— day of ———, One thousand eight hundred and ———.

Signed by the said John Wilson in the presence of } JOHN WILSON.

Signed by the said William Jackson in the presence of } WILLIAM JACKSON.

Certificate Showing that Income-Tax has been Deducted.

This is to certify that on paying to John Brown the sum of £45, being the amount of one year's dividend (*or* one half year's dividend, as the case may be) on shares (*or* stock) to December 31st, 1869, I deducted for income-tax the sum of 18s. 9d.

Pro the A ——— B ——— Gas Company,
WILLIAM JONES,
Secretary.

June 30th, 1870.

Declaration for Loss of Sealed Share Certificates.

I, ———, of ———, do hereby solemnly and sincerely declare that I am possessed of and entitled to ——— in the ——— Company, ———, and that the said ——— are *bonâ fide* my property, and that they are not pledged or assigned to any person or persons whomsoever for money advanced thereon, or for any consideration whatever. And I further declare that I have made diligent search for the ——, and can nowhere find the same. And I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of an Act made and passed in the fifth and sixth years of the reign of His late Majesty, King William the Fourth, intituled "An Act to repeal an Act of the present session of Parliament, intituled 'An Act for the more effectual abolition of oaths and affirmations taken and made in various departments of the State, and to substitute declarations in lieu thereof,' and for the more entire suppression of voluntary and extra judicial oaths and affidavits, and to make other provisions for the abolition of unnecessary oaths."

Declared at ——, this —— day of ———, One thousand eight hundred and ——, before me.

[The above declaration is to be made before a commissioner to administer oaths in Chancery in England. Any person making a false declaration is declared guilty of a misdemeanour.]

Indemnity for Loss of Share Certificates or Dividend Warrant.

——————— Company.

Whereas ———, in the company called the ———, numbered ——, being the property of ———, the undersigned, h— by accident been lost or destroyed, and the said company have consented to give ———, on being indemnified for so doing. Now in consideration of the said company so granting to me, the said ———, a ———, we the undersigned ——— and ——— do hereby severally and respectively undertake and agree to save harmless and keep indemnified the directors for the time being of the said company of and from all losses, damages, and expenses which they, any or either of them, may sustain, incur, or be put unto, for or in consequence of their so granting such new ———; and also from and against all claim or claims to be at any time hereafter made upon the said company for or in respect of the original ——— by any person or persons whomsoever.

Dated this —— day of ———, One thousand eight hundred and ——.

TERMS FOR LEASES, ETC.

England and Ireland.		*Scotland.*	
Lady Day	March 25th.	Candlemas	February 2nd.
Midsummer	June 24th.	Whitsunday	May 15th.
Michaelmas	September 29th.	Lammas	August 1st.
Christmas	December 25th.	Martinmas	November 11th.

When a Scottish term falls on Sunday, the Monday following is considered term day.

LAW TERMS.

England and Ireland.

Hilary or Lent	Begins,	Jan. 11th	Ends,	Jan. 31st.
Easter	,,	April 15th	,,	May 8th.
Trinity	,,	May 22nd	,,	June 12th.
Michaelmas	,,	Nov. 2nd	,,	Nov. 25th.

Scotland.

Candlemas	Begins,	Jan. 15th	Ends,	Feb. 3rd.
Whitsunday	,,	May 12th	,,	June 2nd.
Lammas	,,	June 17th	,,	July 5th.
Martinmas	,,	Nov. 24th	,,	Dec. 20th.

TABLE

Of the Sums paid for £100 of Share Capital of Gas Companies on the Purchase of the Gas-Works by Corporations or Commissioners in the undermentioned Towns.

Name.	Date when Purchased.	Sum paid for £100 of Share Capital.
Oldham	1837	200
Rochdale	1844	167
Burnley	1854	300
Darlington	1854	200
Halifax	1856	240
Bury, Lancashire	1857	250
Birkenhead	1858	220
Macclesfield	1861	250
Sowerby Bridge	1861	159
Glasgow		
Dundee		

TABLES

Showing the Value of Gas, from 100 to 1,000,000 Cubic Feet, at Given Rates.

I.—From 2s. 6d. to 3s. per 1000 Cubic Feet.

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.							Cubic Feet of Gas Consumed.
	2s. 6d.	2s. 7d.	2s. 8d.	2s. 9d.	2s. 10d.	2s. 11d.	3s. 0d.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
100	. . 3	. . 3	. . 3	. . 3½	. . 3½	. . 3½	. . 3½	100
200	. . 6	. . 6	. . 6½	. . 6½	. . 7	. . 7	. . 7	200
300	. . 9	. . 9½	. . 9½	. . 10	. . 10	. . 10½	. . 11	300
400	. 1 0	. 1 0½	. 1 1	. 1 1	. 1 1½	. 1 2	. 1 2½	400
500	. 1 3	. 1 3½	. 1 4	. 1 4½	. 1 5	. 1 5½	. 1 6	500
600	. 1 6	. 1 6½	. 1 7	. 1 8	. 1 8½	. 1 9	. 1 9½	600
700	. 1 9	. 1 9½	. 1 10½	. 1 11	. 2 0	. 2 0½	. 2 1	700
800	. 2 0	. 2 1	. 2 1½	. 2 2½	. 2 3	. 2 4	. 2 5	800
900	. 2 3	. 2 4	. 2 5	. 2 5½	. 2 6½	. 2 7½	. 2 8½	900
1,000	. 2 6	. 2 7	. 2 8	. 2 9	. 2 10	. 2 11	. 3 0	1,000
1,100	. 2 9	. 2 10	. 2 11	. 3 0½	. 3 1½	. 3 2½	. 3 3½	1,100
1,200	. 3 0	. 3 1	. 3 2½	. 3 3½	. 3 5	. 3 6	. 3 7	1,200
1,300	. 3 3	. 3 4½	. 3 5½	. 3 7	. 3 8	. 3 9½	. 3 11	1,300
1,400	. 3 6	. 3 7½	. 3 9	. 3 10	. 3 11½	. 4 1	. 4 2½	1,400
1,500	. 3 9	. 3 10½	. 4 0	. 4 1½	. 4 3	. 4 4½	. 4 6	1,500
1,600	. 4 0	. 4 1½	. 4 3	. 4 5	. 4 6½	. 4 8	. 4 9½	1,600
1,700	. 4 3	. 4 4½	. 4 6½	. 4 8	. 4 10	. 4 11½	. 5 1	1,700
1,800	. 4 6	. 4 8	. 4 9½	. 4 11½	. 5 1	. 5 3	. 5 5	1,800
1,900	. 4 9	. 4 11	. 5 1	. 5 2½	. 5 4½	. 5 6½	. 5 8½	1,900.
2,000	. 5 0	. 5 2	. 5 4	. 5 6	. 5 8	. 5 10	. 6 0	2,000
2,100	. 5 3	. 5 5	. 5 7	. 5 9½	. 5 11½	. 6 1½	. 6 3½	2,100
2,200	. 5 6	. 5 8	. 5 10½	. 6 0½	. 6 3	. 6 5	. 6 7	2,200
2,300	. 5 9	. 5 11½	. 6 1½	. 6 4	. 6 6	. 6 8½	. 6 11	2,300
2,400	. 6 0	. 6 2½	. 6 5	. 6 7	. 6 9½	. 7 0	. 7 2½	2,400
2,500	. 6 3	. 6 5½	. 6 8	. 6 10½	. 7 1	. 7 3½	. 7 6	2,500
2,600	. 6 6	. 6 8½	. 6 11	. 7 2	. 7 4½	. 7 7	. 7 9½	2,600
2,700	. 6 9	. 6 11½	. 7 2½	. 7 5	. 7 8	. 7 10½	. 8 1	2,700
2,800	. 7 0	. 7 3	. 7 5½	. 7 8½	. 7 11	. 8 2	. 8 5	2,800
2,900	. 7 3	. 7 6	. 7 9	. 7 11½	. 8 2½	. 8 5½	. 8 8½	2,900
3,000	. 7 6	. 7 9	. 8 0	. 8 3	. 8 6	. 8 9	. 9 0	3,000
3,100	. 7 9	. 8 0	. 8 3	. 8 6½	. 8 9½	. 9 0½	. 9 3½	3,100
3,200	. 8 0	. 8 3	. 8 6½	. 8 9½	. 9 1	. 9 4	. 9 7	3,200
3,300	. 8 3	. 8 6½	. 8 9½	. 9 1	. 9 4	. 9 7½	. 9 11	3,300
3,400	. 8 6	. 8 9½	. 9 1	. 9 4	. 9 7½	. 9 11	. 10 2½	3,400
3,500	. 8 9	. 9 0½	. 9 4	. 9 7½	. 9 11	. 10 2½	. 10 6	3,500
3,600	. 9 0	. 9 3½	. 9 7	. 9 11	. 10 2½	. 10 6	. 10 9½	3,600
3,700	. 9 3	. 9 6½	. 9 10½	. 10 2	. 10 6	. 10 9½	. 11 1	3,700
3,800	. 9 6	. 9 10	. 10 1½	. 10 5½	. 10 9	. 11 1	. 11 5	3,800
3,900	. 9 9	. 10 1	. 10 5	. 10 8½	. 11 0½	. 11 4½	. 11 8½	3,900
4,000	. 10 0	. 10 4	. 10 8	. 11 0	. 11 4	. 11 8	. 12 0	4,000
4,100	. 10 3	. 10 7	. 10 11	. 11 3½	. 11 7½	. 11 11½	. 12 3½	4,100
4,200	. 10 6	. 10 10	. 11 2½	. 11 6½	. 11 11	. 12 3	. 12 7	4,200
4,300	. 10 9	. 11 1½	. 11 5½	. 11 10	. 12 2	. 12 6½	. 12 11	4,300
4,400	. 11 0	. 11 4½	. 11 9	. 12 1	. 12 5½	. 12 10	. 13 2½	4,400
4,500	. 11 3	. 11 7½	. 12 0	. 12 4½	. 12 9	. 13 1½	. 13 6	4,500
4,600	. 11 6	. 11 10½	. 12 3	. 12 8	. 13 0½	. 13 5	. 13 9½	4,600
4,700	. 11 9	. 12 1½	. 12 6½	. 12 11	. 13 4	. 13 8½	. 14 1	4,700
4,800	. 12 0	. 12 5	. 12 9½	. 13 2½	. 13 7	. 14 0	. 14 5	4,800
4,900	. 12 3	. 12 8	. 13 1	. 13 5½	. 13 10½	. 14 3½	. 14 8½	4,900
5,000	. 12 6	. 12 11	. 13 4	. 13 9	. 14 2	. 14 7	. 15 0	5,000
5,100	. 12 9	. 13 2	. 13 7	. 14 0½	. 14 5½	. 14 10½	. 15 3½	5,100
5,200	. 13 0	. 13 5	. 13 10½	. 14 3½	. 14 9	. 15 2	. 15 7	5,200
5,300	. 13 3	. 13 8½	. 14 1½	. 14 7	. 15 0	. 15 5½	. 15 11	5,300
5,400	. 13 6	. 13 11½	. 14 5	. 14 10	. 15 3½	. 15 9	. 16 2½	5,400
5,500	. 13 9	. 14 2½	. 14 8	. 15 1½	. 15 7	. 16 0½	. 16 6	5,500
5,600	. 14 0	. 14 5½	. 14 11	. 15 5	. 15 10½	. 16 4	. 16 9½	5,600
5,700	. 14 3	. 14 8½	. 15 2½	. 15 8	. 16 2	. 16 7½	. 17 1	5,700
5,800	. 14 6	. 15 0	. 15 5½	. 15 11½	. 16 5	. 16 11	. 17 5	5,800
5,900	. 14 9	. 15 3	. 15 9	. 16 2½	. 16 8½	. 17 2½	. 17 8½	5,900
6,000	. 15 0	. 15 6	. 16 0	. 16 6	. 17 0	. 17 6	. 18 0	6,000
6,100	. 15 3	. 15 9	. 16 3	. 16 9½	. 17 3½	. 17 9½	. 18 3½	6,100
6,200	. 15 6	. 16 0	. 16 6½	. 17 0½	. 17 7	. 18 1	. 18 7	6,200
6,300	. 15 9	. 16 3½	. 16 9½	. 17 4	. 17 10	. 18 4½	. 18 11	6,300

I.—From 2*s.* 6*d.* to 3*s.* per 1000 Cubic Feet—(*continued.*)

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.							Cubic Feet of Gas Consumed.
	2s. 6d.	2s. 7d.	2s. 8d.	2s. 9d.	2s. 10d.	2s. 11d.	3s. 0d.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
6,400	. 16 0	. 16 6½	. 17 1	. 17 7	. 18 1½	. 18 8	. 19 2½	6,400
6,500	. 16 3	. 16 9½	. 17 4	. 17 10½	. 18 5	. 18 11½	. 19 6	6,500
6,600	. 16 6	. 17 0½	. 17 7	. 18 2	. 18 8½	. 19 3	. 19 9½	6,600
6,700	. 16 9	. 17 3½	. 17 10½	. 18 5	. 19 0	. 19 6½	1 0 1	6,700
6,800	. 17 0	. 17 7	. 18 1½	. 18 8½	. 19 3	. 19 10	1 0 5	6,800
6,900	. 17 3	. 17 10	. 18 5	. 18 11½	. 19 6½	1 0 1½	1 0 8½	6,900
7,000	. 17 6	. 18 1	. 18 8	. 19 3	. 19 10	1 0 5	1 1 0	7,000
7,100	. 17 9	. 18 4	. 18 11	. 19 6½	1 0 1½	1 0 8½	1 1 3½	7,100
7,200	. 18 0	. 18 7	. 19 2½	. 19 9½	1 0 5	1 1 0	1 1 7	7,200
7,300	. 18 3	. 18 10½	. 19 5½	1 0 1	1 0 8	1 1 3½	1 1 11	7,300
7,400	. 18 6	. 19 1½	. 19 9	1 0 4	1 0 11½	1 1 7	1 2 2½	7,400
7,500	. 18 9	. 19 4½	1 0 0	1 0 7½	1 1 3	1 1 10½	1 2 6	7,500
7,600	. 19 0	. 19 7½	1 0 3	1 0 11	1 1 6½	1 2 2	1 2 9½	7,600
7,700	. 19 3	. 19 10½	1 0 6½	1 1 2	1 1 10	1 2 5½	1 3 1	7,700
7,800	. 19 6	1 0 2	1 0 9½	1 1 5½	1 2 1	1 2 9	1 3 5	7,800
7,900	. 19 9	1 0 5	1 1 1	1 1 8½	1 2 4½	1 3 0½	1 3 8½	7,900
8,000	1 0 0	1 0 8	1 1 4	1 2 0	1 2 8	1 3 4	1 4 0	8,000
8,100	1 0 3	1 0 11	1 1 7	1 2 3½	1 2 11½	1 3 7½	1 4 3½	8,100
8,200	1 0 6	1 1 2	1 1 10½	1 2 6½	1 3 3	1 3 11	1 4 7	8,200
8,300	1 0 9	1 1 5½	1 2 1½	1 2 10	1 3 6	1 4 2½	1 4 11	8,300
8,400	1 1 0	1 1 8½	1 2 5	1 3 1	1 3 9½	1 4 6	1 5 2½	8,400
8,500	1 1 3	1 1 11½	1 2 8	1 3 4½	1 4 1	1 4 9½	1 5 6	8,500
8,600	1 1 6	1 2 2½	1 2 11	1 3 8	1 4 4½	1 5 1	1 5 9½	8,600
8,700	1 1 9	1 2 5½	1 3 2½	1 3 11	1 4 8	1 5 4½	1 6 1	8,700
8,800	1 2 0	1 2 9	1 3 5½	1 4 2½	1 4 11	1 5 8	1 6 5	8,800
8,900	1 2 3	1 3 0	1 3 9	1 4 5½	1 5 2½	1 5 11½	1 6 8½	8,900
9,000	1 2 6	1 3 3	1 4 0	1 4 9	1 5 6	1 6 3	1 7 0	9,000
9,100	1 2 9	1 3 6	1 4 3	1 5 0½	1 5 9½	1 6 6½	1 7 3½	9,100
9,200	1 3 0	1 3 9	1 4 6½	1 5 3½	1 6 1	1 6 10	1 7 7	9,200
9,300	1 3 3	1 4 0½	1 4 9½	1 5 7	1 6 4	1 7 1½	1 7 11	9,300
9,400	1 3 6	1 4 3½	1 5 1	1 5 10	1 6 7½	1 7 5	1 8 2½	9,400
9,500	1 3 9	1 4 6½	1 5 4	1 6 1½	1 6 11	1 7 8½	1 8 6	9,500
9,600	1 4 0	1 4 9½	1 5 7	1 6 5	1 7 2½	1 8 0	1 8 9½	9,600
9,700	1 4 3	1 5 0½	1 5 10½	1 6 8	1 7 6	1 8 3½	1 9 1	9,700
9,800	1 4 6	1 5 4	1 6 1½	1 6 11½	1 7 9	1 8 7	1 9 5	9,800
9,900	1 4 9	1 5 7	1 6 5	1 7 2½	1 8 0½	1 8 10½	1 9 8½	9,900
10,000	1 5 0	1 5 10	1 6 8	1 7 6	1 8 4	1 9 2	1 10 0	10,000
11,000	1 7 6	1 8 5	1 9 4	1 10 3	1 11 2	1 12 1	1 13 0	11,000
12,000	1 10 0	1 11 0	1 12 0	1 13 0	1 14 0	1 15 0	1 16 0	12,000
13,000	1 12 6	1 13 7	1 14 8	1 15 9	1 16 10	1 17 11	1 19 0	13,000
14,000	1 15 0	1 16 2	1 17 4	1 18 6	1 19 8	2 0 10	2 2 0	14,000
15,000	1 17 6	1 18 9	2 0 0	2 1 3	2 2 6	2 3 9	2 5 0	15,000
16,000	2 0 0	2 1 4	2 2 8	2 4 0	2 5 4	2 6 8	2 8 0	16,000
17,000	2 2 6	2 3 11	2 5 4	2 6 9	2 8 2	2 9 7	2 11 0	17,000
18,000	2 5 0	2 6 6	2 8 0	2 9 6	2 11 0	2 12 6	2 14 0	18,000
19,000	2 7 6	2 9 1	2 10 8	2 12 3	2 13 10	2 15 5	2 17 0	19,000
20,000	2 10 0	2 11 8	2 13 4	2 15 0	2 16 8	2 18 4	3 0 0	20,000
21,000	2 12 6	2 14 3	2 16 0	2 17 9	2 19 6	3 1 3	3 3 0	21,000
22,000	2 15 0	2 16 10	2 18 8	3 0 6	3 2 4	3 4 2	3 6 0	22,000
23,000	2 17 6	2 19 5	3 1 4	3 3 3	3 5 2	3 7 1	3 9 0	23,000
24,000	3 0 0	3 2 0	3 4 0	3 6 0	3 8 0	3 10 0	3 12 0	24,000
25,000	3 2 6	3 4 7	3 6 8	3 8 9	3 10 10	3 12 11	3 15 0	25,000
26,000	3 5 0	3 7 2	3 9 4	3 11 6	3 13 8	3 15 10	3 18 0	26,000
27,000	3 7 6	3 9 9	3 12 0	3 14 3	3 16 6	3 18 9	4 1 0	27,000
28,000	3 10 0	3 12 4	3 14 8	3 17 0	3 19 4	4 1 8	4 4 0	28,000
29,000	3 12 6	3 14 11	3 17 4	3 19 9	4 2 2	4 4 7	4 7 0	29,000
30,000	3 15 0	3 17 6	4 0 0	4 2 6	4 5 0	4 7 6	4 10 0	30,000
31,000	3 17 6	4 0 1	4 2 8	4 5 3	4 7 10	4 10 5	4 13 0	31,000
32,000	4 0 0	4 2 8	4 5 4	4 8 0	4 10 8	4 13 4	4 16 0	32,000
33,000	4 2 6	4 5 3	4 8 0	4 10 9	4 13 6	4 16 3	4 19 0	33,000
34,000	4 5 0	4 7 10	4 10 8	4 13 6	4 16 4	4 19 2	5 2 0	34,000
35,000	4 7 6	4 10 5	4 13 4	4 16 3	4 19 2	5 2 1	5 5 0	35,000
36,000	4 10 0	4 13 0	4 16 0	4 19 0	5 2 0	5 5 0	5 8 0	36,000
37,000	4 12 6	4 15 7	4 18 8	5 1 9	5 4 10	5 7 11	5 11 0	37,000
38,000	4 15 0	4 18 2	5 1 4	5 4 6	5 7 8	5 10 10	5 14 0	38,000
39,000	4 17 6	5 0 9	5 4 0	5 7 3	5 10 6	5 13 9	5 17 0	39,000
40,000	5 0 0	5 3 4	5 6 8	5 10 0	5 13 4	5 16 8	6 0 0	40,000
41,000	5 2 6	5 5 11	5 9 4	5 12 9	5 16 2	5 19 7	6 3 0	41,000

I.—From 2s. 6d. to 3s. per 1000 Cubic Feet—(*continued.*)

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.																					Cubic Feet of Gas Consumed.
	2s. 6d.			2s. 7d.			2s. 8d.			2s. 9d.			2s. 10d.			2s. 11d.			3s. 0d.			
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
42,000	5	5	0	5	8	6	5	12	0	5	15	6	5	19	0	6	2	6	6	6	0	42,000
43,000	5	7	6	5	11	1	5	14	8	5	18	3	6	1	10	6	5	5	6	9	0	43,000
44,000	5	10	0	5	13	8	5	17	4	6	1	0	6	4	8	6	8	4	6	12	0	44,000
45,000	5	12	6	5	16	3	6	0	0	6	3	9	6	7	6	6	11	3	6	15	0	45,000
46,000	5	15	0	5	18	10	6	2	8	6	6	6	6	10	4	6	14	2	6	18	0	46,000
47,000	5	17	6	6	1	5	6	5	4	6	9	3	6	13	2	6	17	1	7	1	0	47,000
48,000	6	0	0	6	4	0	6	8	0	6	12	0	6	16	0	7	0	0	7	4	0	48,000
49,000	6	2	6	6	6	7	6	10	8	6	14	9	6	18	10	7	2	11	7	7	0	49,000
50,000	6	5	0	6	9	2	6	13	4	6	17	6	7	1	8	7	5	10	7	10	0	50,000
51,000	6	7	6	6	11	9	6	16	0	7	0	3	7	4	6	7	8	9	7	13	0	51,000
52,000	6	10	0	6	14	4	6	18	8	7	3	0	7	7	4	7	11	8	7	16	0	52,000
53,000	6	12	6	6	16	11	7	1	4	7	5	9	7	10	2	7	14	7	7	19	0	53,000
54,000	6	15	0	6	19	6	7	4	0	7	8	6	7	13	0	7	17	6	8	2	0	54,000
55,000	6	17	6	7	2	1	7	6	8	7	11	3	7	15	10	8	0	5	8	5	0	55,000
56,000	7	0	0	7	4	8	7	9	4	7	14	0	7	18	8	8	3	4	8	8	0	56,000
57,000	7	2	6	7	7	3	7	12	0	7	16	9	8	1	6	8	6	3	8	11	0	57,000
58,000	7	5	0	7	9	10	7	14	8	7	19	6	8	4	4	8	9	2	8	14	0	58,000
59,000	7	7	6	7	12	5	7	17	4	8	2	3	8	7	2	8	12	1	8	17	0	59,000
60,000	7	10	0	7	15	0	8	0	0	8	5	0	8	10	0	8	15	0	9	0	0	60,000
61,000	7	12	6	7	17	7	8	2	8	8	7	9	8	12	10	8	17	11	9	3	0	61,000
62,000	7	15	0	8	0	2	8	5	4	8	10	6	8	15	8	9	0	10	9	6	0	62,000
63,000	7	17	6	8	2	9	8	8	0	8	13	3	8	18	6	9	3	9	9	9	0	63,000
64,000	8	0	0	8	5	4	8	10	8	8	16	0	9	1	4	9	6	8	9	12	0	64,000
65,000	8	2	6	8	7	11	8	13	4	8	18	9	9	4	2	9	9	7	9	15	0	65,000
66,000	8	5	0	8	10	6	8	16	0	9	1	6	9	7	0	9	12	6	9	18	0	66,000
67,000	8	7	6	8	13	1	8	18	8	9	4	3	9	9	10	9	15	5	10	1	0	67,000
68,000	8	10	0	8	15	8	9	1	4	9	7	0	9	12	8	9	18	4	10	4	0	68,000
69,000	8	12	6	8	18	3	9	4	0	9	9	9	9	15	6	10	1	3	10	7	0	69,000
70,000	8	15	0	9	0	10	9	6	8	9	12	6	9	18	4	10	4	2	10	10	0	70,000
71,000	8	17	6	9	3	5	9	9	4	9	15	3	10	1	2	10	7	1	10	13	0	71,000
72,000	9	0	0	9	6	0	9	12	0	9	18	0	10	4	0	10	10	0	10	16	0	72,000
73,000	9	2	6	9	8	7	9	14	8	10	0	9	10	6	10	10	12	11	10	19	0	73,000
74,000	9	5	0	9	11	2	9	17	4	10	3	6	10	9	8	10	15	10	11	2	0	74,000
75,000	9	7	6	9	13	9	10	0	0	10	6	3	10	12	6	10	18	9	11	5	0	75,000
76,000	9	10	0	9	16	4	10	2	8	10	9	0	10	15	4	11	1	8	11	8	0	76,000
77,000	9	12	6	9	18	11	10	5	4	10	11	9	10	18	2	11	4	7	11	11	0	77,000
78,000	9	15	0	10	1	6	10	8	0	10	14	6	11	1	0	11	7	6	11	14	0	78,000
79,000	9	17	6	10	4	1	10	10	8	10	17	3	11	3	10	11	10	5	11	17	0	79,000
80,000	10	0	0	10	6	8	10	13	4	11	0	0	11	6	8	11	13	4	12	0	0	80,000
81,000	10	2	6	10	9	3	10	16	0	11	2	9	11	9	6	11	16	3	12	3	0	81,000
82,000	10	5	0	10	11	10	10	18	8	11	5	6	11	12	4	11	19	2	12	6	0	82,000
83,000	10	7	6	10	14	5	11	1	4	11	8	3	11	15	2	12	2	1	12	9	0	83,000
84,000	10	10	0	10	17	0	11	4	0	11	11	0	11	18	0	12	5	0	12	12	0	84.000
85,000	10	12	6	10	19	7	11	6	8	11	13	9	12	0	10	12	7	11	12	15	0	85,000
86,000	10	15	0	11	2	2	11	9	4	11	16	6	12	3	8	12	10	10	12	18	0	86,000
87,000	10	17	6	11	4	9	11	12	0	11	19	3	12	6	6	12	13	9	13	1	0	87,000
88.000	11	0	0	11	7	4	11	14	8	12	2	0	12	9	4	12	16	8	13	4	0	88,000
89,000	11	2	6	11	9	11	11	17	4	12	4	9	12	12	2	12	19	7	13	7	0	89,000
90,000	11	5	0	11	12	6	12	0	0	12	7	6	12	15	0	13	2	6	13	10	0	90,000
91,000	11	7	6	11	15	1	12	2	8	12	10	3	12	17	10	13	5	5	13	13	0	91,000
92,000	11	10	0	11	17	8	12	5	4	12	13	0	13	0	8	13	8	4	13	16	0	92,000
93,000	11	12	6	12	0	3	12	8	0	12	15	9	13	3	6	13	11	3	13	19	0	93,000
94,000	11	15	0	12	2	10	12	10	8	12	18	6	13	6	4	13	14	2	14	2	0	94,000
95,000	11	17	6	12	5	5	12	13	4	13	1	3	13	9	2	13	17	1	14	5	0	95,000
96,000	12	0	0	12	8	0	12	16	0	13	4	0	13	12	0	14	0	0	14	8	0	96,000
97,000	12	2	6	12	10	7	12	18	8	13	6	9	13	14	10	14	2	11	14	11	0	97,000
98,000	12	5	0	12	13	2	13	1	4	13	9	6	13	17	8	14	5	10	14	14	0	98,000
99,000	12	7	6	12	15	9	13	4	0	13	12	3	14	0	6	14	8	9	14	17	0	99,000
100,000	12	10	0	12	18	4	13	6	8	13	15	0	14	3	4	14	11	8	15	0	0	100,000
200,000	25	0	0	25	16	8	26	13	4	27	10	0	28	6	8	29	3	4	30	0	0	200,000
300,000	37	10	0	38	15	0	40	0	0	41	5	0	42	10	0	43	15	0	45	0	0	300,000
400,000	50	0	0	51	13	4	53	6	8	55	0	0	56	13	4	58	6	8	60	0	0	400,000
500,000	62	10	0	64	11	8	66	13	4	68	15	0	70	16	8	72	18	4	75	0	0	500,000
600,000	75	0	0	77	10	0	80	0	0	82	10	0	85	0	0	87	10	0	90	0	0	600,000
700,000	87	10	0	90	8	4	93	6	8	96	5	0	99	3	4	102	1	8	105	0	0	700,000
800,000	100	0	0	103	6	8	106	13	4	110	0	0	113	6	8	116	13	4	120	0	0	800,000
900.000	112	10	0	116	5	0	120	0	0	123	15	0	127	10	0	131	5	0	135	0	0	900,000
1,000,000	125	0	0	129	3	4	133	6	8	137	10	0	141	13	4	145	16	8	150	0	0	1,000,000

TABLES

Showing the Value of Gas, from 100 *to* 1,000,000 *Cubic Feet, at Given Rates.*

II.—From 3*s.* 1*d.* to 3*s.* 7*d.* per 1000 Cubic Feet.

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.							Cubic Feet of Gas Consumed.
	3s. 1d.	3s. 2d.	3s. 3d.	3s. 4d.	3s. 5d.	3s. 6d.	3s. 7d.	
	£ s. d.	£ s. d.	£ 's. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
100	. . 3½	. . 4	. . 4	. . 4	.. . 4	. . 4	. . 4½	100
200	. . 7½	. . 7½	. . 8	. . 8	. . 8	. . 8½	. . 8½	200
300	. . 11	. . 11½	. . 11½	. 1 0	. 1 0½	. 1 0½	. 1 1	300
400	. 1 3	. 1 3	. 1 3½	. 1 4	. 1 4½	. 1 5	. 1 5	400
500	. 1 6½	. 1 7	. 1 7½	. 1 8	. 1 8½	. 1 9	. 1 9½	500
600	. 1 10	. 1 11	. 1 11½	. 2 0	. 2 0½	. 2 1	. 2 2	600
700	. 2 2	. 2 2½	. 2 3½	. 2 4	. 2 4½	. 2 5½	. 2 6	700
800	. 2 5½	. 2 6½	. 2 7	. 2 8	. 2 9	. 2 9½	. 2 10½	800
900	. 2 9½	. 2 10	. 2 11	. 3 0	. 3 1	. 3 2	. 3 2½	900
1,000	. 3 1	. 3 2	. 3 3	. 3 4	. 3 5	. 3 6	. 3 7	1,000
1,100	. 3 4½	. 3 6	. 3 7	. 3 8	. 3 9	. 3 10	. 3 11½	1,100
1,200	. 3 8½	. 3 9½	. 3 11	. 4 0	. 4 1	. 4 2½	. 4 3½	1,200
1,300	. 4 0	. 4 1½	. 4 2½	. 4 4	. 4 5½	. 4 6½	. 4 8	1,300
1,400	. 4 4	. 4 5	. 4 6½	. 4 8	. 4 9½	. 4 11	. 5 0	1,400
1,500	. 4 7½	. 4 9	. 4 10½	. 5 0	. 5 1½	. 5 3	. 5 4½	1,500
1,600	. 4 11	. 5 1	. 5 2½	. 5 4	. 5 5½	. 5 7	. 5 9	1,600
1,700	. 5 3	. 5 4½	. 5 6½	. 5 8	. 5 9½	. 5 11½	. 6 1	1,700
1,800	. 5 6½	. 5 8½	. 5 10	. 6 0	. 6 2	. 6 3½	. 6 5½	1,800
1,900	. 5 10½	. 6 0	. 6 2	. 6 4	. 6 6	. 6 8	. 6 9½	1,900
2,000	. 6 2	. 6 4	. 6 6	. 6 8	. 6 10	. 7 0	. 7 2	2,000
2,100	. 6 5½	. 6 8	. 6 10	. 7 0	. 7 2	. 7 4	. 7 6½	2,100
2,200	. 6 9½	. 6 11½	. 7 2	. 7 4	. 7 6	. 7 8½	. 7 10½	2,200
2,300	. 7 1	. 7 3½	. 7 5½	. 7 8	. 7 10½	. 8 0½	. 8 3	2,300
2,400	. 7 5	. 7 7	. 7 9½	. 8 0	. 8 2½	. 8 5	. 8 7	2,400
2,500	. 7 8½	. 7 11	. 8 1½	. 8 4	. 8 6½	. 8 9	. 8 11½	2,500
2,600	. 8 0	. 8 3	. 8 5½	. 8 8	. 8 10½	. 9 1	. 9 4	2,600
2,700	8 4	. 8 6½	. 8 9½	. 9 0	. 9 2½	. 9 5½	. 9 8	2,700
2,800	. 8 7½	. 8 10½	. 9 1	. 9 4	. 9 7	. 9 9½	. 10 0½	2,800
2,900	. 8 11½	. 9 2	. 9 5	. 9 8	. 9 11	. 10 2	. 10 4½	2,900
3,000	. 9 3	. 9 6	. 9 9	. 10 0	. 10 3	. 10 6	. 10 9	3,000
3,100	. 9 6½	. 9 10	. 10 1	. 10 4	. 10 7	. 10 10	. 11 1½	3,100
3,200	. 9 10½	. 10 1½	. 10 5	. 10 8	. 10 11	. 11 2½	. 11 5½	3,200
3,300	. 10 2	. 10 5½	. 10 8½	. 11 0	. 11 3½	. 11 6½	. 11 10	3,300
3,400	. 10 6	. 10 9	. 11 0½	. 11 4	. 11 7½	. 11 11	. 12 2	3,400
3,500	. 10 9½	. 11 1	. 11 4½	. 11 8	. 11 11½	. 12 3	. 12 6½	3,500
3,600	. 11 1	. 11 5	. 11 8½	. 12 0	. 12 3½	. 12 7	. 12 11	3,600
3,700	. 11 5	. 11 8½	. 12 0½	. 12 4	. 12 7½	. 12 11½	. 13 3	3,700
3,800	. 11 8½	. 12 0½	. 12 4	. 12 8	. 13 0	. 13 3½	. 13 7½	3,800
3,900	. 12 0½	. 12 4	. 12 8	. 13 0	. 13 4	. 13 8	. 13 11½	3,900
4,000	. 12 4	. 12 8	. 13 0	. 13 4	. 13 8	. 14 0	. 14 4	4,000
4,100	. 12 7½	. 13 0	. 13 4	. 13 8	. 14 0	. 14 4	. 14 8½	4,100
4,200	. 12 11½	. 13 3½	. 13 8	. 14 0	. 14 4	. 14 8½	. 15 0½	4,200
4,300	. 13 3	. 13 7½	. 13 11½	. 14 4	. 14 8½	. 15 0½	. 15 5	4,300
4,400	. 13 7	. 13 11	. 14 3½	. 14 8	. 15 0½	. 15 5	. 15 9	4,400
4,500	. 13 10½	. 14 3	. 14 7½	. 15 0	. 15 4½	. 15 9	. 16 1½	4,500
4,600	. 14 2	. 14 7	. 14 11½	. 15 4	. 15 8½	. 16 1	. 16 6	4,600
4,700	. 14 6	. 14 10½	. 15 3½	. 15 8	. 16 0½	. 16 5½	. 16 10	4,700
4,800	. 14 9½	. 15 2½	. 15 7	. 16 0	. 16 5	. 16 9½	. 17 2½	4,800
4,900	. 15 1½	. 15 6	. 15 11	. 16 4	. 16 9	. 17 2	. 17 6½	4,900
5,000	. 15 5	. 15 10	. 16 3	. 16 8	. 17 1	. 17 6	. 17 11	5,000
5,100	. 15 8½	. 16 2	. 16 7	. 17 0	. 17 5	. 17 10	. 18 3½	5,100
5,200	. 16 0½	. 16 5½	. 16 11	. 17 4	. 17 9	. 18 2½	. 18 7½	5,200
5,300	. 16 4	. 16 9½	. 17 2½	. 17 8	. 18 1½	. 18 6½	. 19 0	5,300
5,400	. 16 8	. 17 1	. 17 6½	. 18 0	. 18 5½	. 18 11	. 19 4	5,400
5,500	. 16 11½	. 17 5	. 17 10½	. 18 4	. 18 9½	. 19 3	. 19 8½	5,500
5,600	. 17 3	. 17 9	. 18 2½	. 18 8	. 19 1½	. 19 7	1 0 1	5,600
5,700	. 17 7	. 18 0½	. 18 6½	. 19 0	. 19 5½	. 19 11½	1 0 5	5,700
5,800	. 17 10½	. 18 4½	. 18 10	. 19 4	. 19 10	1 0 3½	1 0 9½	5,800
5,900	. 18 2½	. 18 8	. 19 2	. 19 8	1 0 2	1 0 8	1 1 1½	5,900
6,000	. 18 6	. 19 0	. 19 6	1 0 0	1 0 6	1 1 0	1 1 6	6,000
6,100	. 18 9½	. 19 4	. 19 10	1 0 4	1 0 10	1 1 4	1 1 10½	6,100
6,200	. 19 1½	. 19 7½	1 0 2	1 0 8	1 1 2	1 1 8½	1 2 2½	6,200
6,300	. 19 5	. 19 11½	1 0 5½	1 1 0	1 1 6½	1 2 0½	1 2 7	6,300

II.—From 3*s.* 1*d.* to 3*s.* 7*d.* per 1000 Cubic Feet—(*continued.*)

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.							Cubic Feet of Gas Consumed.
	3s. 1d.	3s. 2d.	3s. 3d.	3s. 4d.	3s. 5d.	3s. 6d.	3s. 7s.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
6,400	. 19 9	1 0 3	1 0 9½	1 1 4	1 1 10½	1 2 5	1 2 11	6,400
6,500	1 0 0½	1 0 7	1 1 1½	1 1 8	1 2 2½	1 2 9	1 3 3½	6,500
6,600	1 0 4	1 0 11	1 1 5½	1 2 0	1 2 6½	1 3 1	1 3 8	6,600
6,700	1 0 8	1 1 2½	1 1 9½	1 2 4	1 2 10½	1 3 5½	1 4 0	6,700
6,800	1 0 11½	1 1 6½	1 2 1	1 2 8	1 3 3	1 3 9½	1 4 4½	6,800
6,900	1 1 3½	1 1 10	1 2 5	1 3 0	1 3 7	1 4 2	1 4 8½	6,900
7,000	1 1 7	1 2 2	1 2 9	1 3 4	1 3 11	1 4 6	1 5 1	7,000
7,100	1 1 10½	1 2 6	1 3 1	1 3 8	1 4 3	1 4 10	1 5 5½	7,100
7,200	1 2 2½	1 2 9½	1 3 5	1 4 0	1 4 7	1 5 2½	1 5 9½	7,200
7,300	1 2 6	1 3 1½	1 3 8½	1 4 4	1 4 11½	1 5 6½	1 6 2	7,300
7,400	1 2 10	1 3 5	1 4 0½	1 4 8	1 5 3½	1 5 11	1 6 6	7,400
7,500	1 3 1½	1 3 9	1 4 4½	1 5 0	1 5 7½	1 6 3	1 6 10½	7,500
7,600	1 3 5	1 4 1	1 4 8½	1 5 4	1 5 11½	1 6 7	1 7 3	7,600
7,700	1 3 9	1 4 4½	1 5 0½	1 5 8	1 6 3½	1 6 11½	1 7 7	7,700
7,800	1 4 0½	1 4 8½	1 5 4	1 6 0	1 6 8	1 7 3½	1 7 11½	7,800
7,900	1 4 4½	1 5 0	1 5 8	1 6 4	1 7 0	1 7 8	1 8 3½	7,900
8,000	1 4 8	1 5 4	1 6 0	1 6 8	1 7 4	1 8 0	1 8 8	8,000
8,100	1 4 11½	1 5 8	1 6 4	1 7 0	1 7 8	1 8 4	1 9 0½	8,100
8,200	1 5 3½	1 5 11½	1 6 8	1 7 4	1 8 0	1 8 8½	1 9 4½	8,200
8,300	1 5 7	1 6 3½	1 6 11½	1 7 8	1 8 4½	1 9 0½	1 9 9	8,300
8,400	1 5 11	1 6 7	1 7 3½	1 8 0	1 8 8½	1 9 5	1 10 1	8,400
8,500	1 6 2½	1 6 11	1 7 7½	1 8 4	1 9 0½	1 9 9	1 10 5½	8,500
8,600	1 6 6	1 7 3	1 7 11½	1 8 8	1 9 4½	1 10 1	1 10 10	8,600
8,700	1 6 10	1 7 6½	1 8 3½	1 9 0	1 9 8½	1 10 5½	1 11 2	8,700
8,800	1 7 1½	1 7 10½	1 8 7	1 9 4	1 10 1	1 10 9½	1 11 6½	8,800
8,900	1 7 5½	1 8 2	1 8 11	1 9 8	1 10 5	1 11 2	1 11 10½	8,900
9,000	1 7 9	1 8 6	1 9 3	1 10 0	1 10 9	1 11 6	1 12 3	9,000
9,100	1 8 0½	1 8 10	1 9 7	1 10 4	1 11 1	1 11 10	1 12 7½	9,100
9,200	1 8 4½	1 9 1½	1 9 11	1 10 8	1 11 5	1 12 2½	1 12 11½	9,200
9,300	1 8 8	1 9 5½	1 10 2½	1 11 0	1 11 9½	1 12 6½	1 13 4	9,300
9,400	1 9 0	1 9 9	1 10 6½	1 11 4	1 12 1½	1 12 11	1 13 8	9,400
9,500	1 9 3½	1 10 1	1 10 10½	1 11 8	1 12 5½	1 13 3	1 14 0½	9,500
9,600	1 9 7	1 10 5	1 11 2½	1 12 0	1 12 9½	1 13 7	1 14 5	9,600
9,700	1 9 11	1 10 8½	1 11 6½	1 12 4	1 13 1½	1 13 11½	1 14 9	9,700
9,800	1 10 2½	1 11 0½	1 11 10	1 12 8	1 13 6	1 14 3½	1 15 1½	9,800
9,900	1 10 6½	1 11 4	1 12 2	1 13 0	1 13 10	1 14 8	1 15 5½	9,900
10,000	1 10 10	1 11 8	1 12 6	1 13 4	1 14 2	1 15 0	1 15 10	10,000
11,000	1 13 11	1 14 10	1 15 9	1 16 8	1 17 7	1 18 6	1 19 5	11,000
12,000	1 17 0	1 18 0	1 19 0	2 0 0	2 1 0	2 2 0	2 3 0	12,000
13,000	2 0 1	2 1 2	2 2 3	2 3 4	2 4 5	2 5 6	2 6 7	13,000
14,000	2 3 2	2 4 4	2 5 6	2 6 8	2 7 10	2 9 0	2 10 2	14,000
15,000	2 6 3	2 7 6	2 8 9	2 10 0	2 11 3	2 12 6	2 13 9	15,000
16,000	2 9 4	2 10 8	2 12 0	2 13 4	2 14 8	2 16 0	2 17 4	16,000
17,000	2 12 5	2 13 10	2 15 3	2 16 8	2 18 1	2 19 6	3 0 11	17,000
18,000	2 15 6	2 17 0	2 18 6	3 0 0	3 1 6	3 3 0	3 4 6	18,000
19,000	2 18 7	3 0 2	3 1 9	3 3 4	3 4 11	3 6 6	3 8 1	19,000
20,000	3 1 8	3 3 4	3 5 0	3 6 8	3 8 4	3 10 0	3 11 8	20,000
21,000	3 4 9	3 6 6	3 8 3	3 10 0	3 11 9	3 13 6	3 15 3	21,000
22,000	3 7 10	3 9 8	3 11 6	3 13 4	3 15 2	3 17 0	3 18 10	22,000
23,000	3 10 11	3 12 10	3 14 9	3 16 8	3 18 7	4 0 6	4 2 5	23,000
24,000	3 14 0	3 16 0	3 18 0	4 0 0	4 2 0	4 4 0	4 6 0	24,000
25,000	3 17 1	3 19 2	4 1 3	4 3 4	4 5 5	4 7 6	4 9 7	25,000
26,000	4 0 2	4 2 4	4 4 6	4 6 8	4 8 10	4 11 0	4 13 2	26,000
27,000	4 3 3	4 5 6	4 7 9	4 10 0	4 12 3	4 14 6	4 16 9	27,000
28,000	4 6 4	4 8 8	4 11 0	4 13 4	4 15 8	4 18 0	5 0 4	28,000
29,000	4 9 5	4 11 10	4 14 3	4 16 8	4 19 1	5 1 6	5 3 11	29,000
30,000	4 12 6	4 15 0	4 17 6	5 0 0	5 2 6	5 5 0	5 7 6	30,000
31,000	4 15 7	4 18 2	5 0 9	5 3 4	5 5 11	5 8 6	5 11 1	31,000
32,000	4 18 8	5 1 4	5 4 0	5 6 8	5 9 4	5 12 0	5 14 8	32,000
33,000	5 1 9	5 4 6	5 7 3	5 10 0	5 12 9	5 15 6	5 18 3	33,000
34,000	5 4 10	5 7 8	5 10 6	5 13 4	5 16 2	5 19 0	6 1 10	34,000
35,000	5 7 11	5 10 10	5 13 9	5 16 8	5 19 7	6 2 6	6 5 5	35,000
36,000	5 11 0	5 14 0	5 17 0	6 0 0	6 3 0	6 6 0	6 9 0	36,000
37,000	5 14 1	5 17 2	6 0 3	6 3 4	6 6 5	6 9 6	6 12 7	37,000
38,000	5 17 2	6 0 4	6 3 6	6 6 8	6 9 10	6 13 0	6 16 2	38,000
39,000	6 0 3	6 3 6	6 6 9	6 10 0	6 13 3	6 16 6	6 19 9	39,000
40,000	6 3 4	6 6 8	6 10 0	6 13 4	6 16 8	7 0 0	7 3 4	40,000
41,000	6 6 5	6 9 10	6 13 3	6 16 8	7 0 1	7 3 6	7 6 11	41,000

II.—From 3s. 1d. to 3s. 7d. per 1000 Cubic Feet—(*continued.*)

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.																					Cubic Feet of Gas Consumed.
	3s. 1d.			3s. 2d.			3s. 3d.			3s. 4d.			3s. 5d.			3s. 6d.			3s. 7d.			
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
42,000	6	9	6	6	13	0	6	16	6	7	0	0	7	3	6	7	7	0	7	10	6	42,000
43,000	6	12	7	6	16	2	6	19	9	7	3	4	7	6	11	7	10	6	7	14	1	43,000
44,000	6	15	8	6	19	4	7	3	0	7	6	8	7	10	4	7	14	0	7	17	8	44,000
45,000	6	18	9	7	2	6	7	6	3	7	10	0	7	13	2	7	17	6	8	1	3	45,000
46,000	7	1	10	7	5	8	7	9	6	7	13	4	7	17	9	8	1	0	8	4	10	46,000
47,000	7	4	11	7	8	10	7	12	9	7	16	8	8	0	7	8	4	6	8	8	5	47,000
48,000	7	8	0	7	12	0	7	16	0	8	0	0	8	4	0	8	8	0	8	12	0	48,000
49,000	7	11	1	7	15	2	7	19	3	8	3	4	8	7	5	8	11	6	8	15	7	49,000
50,000	7	14	2	7	18	4	8	2	6	8	6	8	8	10	10	8	15	0	8	19	2	50,000
51,000	7	17	3	8	1	6	8	5	9	8	10	0	8	14	3	8	18	6	9	2	9	51,000
52,000	8	0	4	8	4	8	8	9	0	8	13	4	8	17	8	9	2	0	9	6	4	52,000
53,000	8	3	5	8	7	10	8	12	3	8	16	8	9	1	1	9	5	6	9	9	11	53,000
54,000	8	6	6	8	11	0	8	15	6	9	0	0	9	4	6	9	9	0	9	13	6	54,000
55,000	8	9	7	8	14	2	8	18	9	9	3	4	9	7	11	9	12	6	9	17	1	55,000
56,000	8	12	8	8	17	4	9	2	0	9	6	8	9	11	4	9	16	0	10	0	8	56,000
57,000	8	15	9	9	0	6	9	5	3	9	10	0	9	14	9	9	19	6	10	4	3	57,000
58,000	8	18	10	9	3	8	9	8	6	9	13	4	9	18	2	10	3	0	10	7	10	58,000
59,000	9	1	11	9	6	10	9	11	9	9	16	8	10	1	7	10	6	6	10	11	5	59,000
60,000	9	5	0	9	10	0	9	15	0	10	0	0	10	5	0	10	10	0	10	15	0	60,000
61,000	9	8	1	9	13	2	9	18	3	10	3	4	10	8	5	10	13	6	10	18	7	61,000
62,000	9	11	2	9	16	4	10	1	6	10	6	8	10	11	10	10	17	0	11	2	2	62,000
63,000	9	14	3	9	19	6	10	4	9	10	10	0	10	15	3	11	0	6	11	5	9	63,000
64,000	9	17	4	10	2	8	10	8	0	10	13	4	10	18	8	11	4	0	11	9	4	64,000
65,000	10	0	5	10	5	10	10	11	3	10	16	8	11	2	1	11	7	6	11	12	11	65,000
66,000	10	3	6	10	9	0	10	14	6	11	0	0	11	5	6	11	11	0	11	16	6	66,000
67,000	10	6	7	10	12	2	10	17	9	11	3	4	11	8	11	11	14	6	12	0	1	67,000
68,000	10	9	8	10	15	4	11	1	0	11	6	8	11	12	4	11	18	0	12	3	8	68,000
69,000	10	12	9	10	18	6	11	4	3	11	10	0	11	15	9	12	1	6	12	7	3	69,000
70,000	10	15	10	11	1	8	11	7	6	11	13	4	11	19	2	12	5	0	12	10	10	70,000
71,000	10	18	11	11	4	10	11	10	9	11	16	8	12	2	7	12	8	6	12	14	5	71,000
72,000	11	2	0	11	8	0	11	14	0	12	0	0	12	6	0	12	12	0	12	18	0	72,000
73,000	11	5	1	11	11	2	11	17	3	12	3	4	12	9	5	12	15	6	13	1	7	73,000
74,000	11	8	2	11	14	4	12	0	6	12	6	8	12	12	10	12	19	0	13	5	2	74,000
75,000	11	11	3	11	17	6	12	3	9	12	10	0	12	16	3	13	2	6	13	8	9	75,000
76,000	11	14	4	12	0	8	12	7	0	12	13	4	12	19	8	13	6	0	13	12	4	76,000
77,000	11	17	5	12	3	10	12	10	3	12	16	8	13	3	1	13	9	6	13	15	11	77,000
78,000	12	0	6	12	7	0	12	13	6	13	0	0	13	6	6	13	13	0	13	19	6	78,000
79,000	12	3	7	12	10	2	12	16	9	13	3	4	13	9	11	13	16	6	14	3	1	79,000
80,000	12	6	8	12	13	4	13	0	0	13	6	8	13	13	4	14	0	0	14	6	8	80,000
81,000	12	9	9	12	16	6	13	3	3	13	10	0	13	16	9	14	3	6	14	10	3	81,000
82,000	12	12	10	12	19	8	13	6	6	13	13	4	14	0	2	14	7	0	14	13	10	82,000
83,000	12	15	11	13	2	10	13	9	9	13	16	8	14	3	7	14	10	6	14	17	5	83,000
84,000	12	19	0	13	6	0	13	13	0	14	0	0	14	7	0	14	14	0	15	1	0	84,000
85,000	13	2	1	13	9	2	13	16	3	14	3	4	14	10	5	14	17	6	15	4	7	85,000
86,000	13	5	2	13	12	4	13	19	6	14	6	8	14	13	10	15	1	0	15	8	2	86,000
87,000	13	8	3	13	15	6	14	2	9	14	10	0	14	17	3	15	4	6	15	11	9	87,000
88,000	13	11	4	13	18	8	14	6	0	14	13	4	15	0	8	15	8	0	15	15	4	88,000
89,000	13	14	5	14	1	10	14	9	3	14	16	8	15	4	1	15	11	6	15	18	11	89,000
90,000	13	17	6	14	5	0	14	12	6	15	0	0	15	7	6	15	15	0	16	2	6	90,000
91,000	14	0	7	14	8	2	14	15	9	15	3	4	15	10	11	15	18	6	16	6	1	91,000
92,000	14	3	8	14	11	4	14	19	0	15	6	8	15	14	4	16	2	0	16	9	8	92,000
93,000	14	6	9	14	14	6	15	2	3	15	10	0	15	17	9	16	5	6	16	13	3	93,000
94,000	14	9	10	14	17	8	15	5	6	15	13	4	16	1	2	16	9	0	16	16	10	94,000
95,000	14	12	11	15	0	10	15	8	9	15	16	8	16	4	7	16	12	6	17	0	5	95,000
96,000	14	16	0	15	4	0	15	12	0	16	0	0	16	8	0	16	16	0	17	4	0	96,000
97,000	14	19	1	15	7	2	15	15	3	16	3	4	16	11	5	16	19	6	17	7	7	97,000
98,000	15	2	2	15	10	4	15	18	6	16	6	8	16	14	10	17	3	0	17	11	2	98,000
99,000	15	5	3	15	13	6	16	1	9	16	10	0	16	18	3	17	6	6	17	14	9	99,000
100,000	15	8	4	15	16	8	16	5	0	16	13	4	17	1	8	17	10	0	17	18	4	100,000
200,000	30	16	8	31	13	4	32	10	0	33	6	8	34	3	4	35	0	0	35	16	8	200,000
300,000	46	5	0	47	10	0	48	15	0	50	0	0	51	5	0	52	10	0	53	15	0	300,000
400,000	61	13	4	63	6	8	65	0	0	66	13	4	68	6	8	70	0	0	71	13	4	400,000
500,000	77	1	8	79	3	4	81	5	0	83	6	8	85	8	4	87	10	0	89	11	8	500,000
600,000	92	10	0	95	0	0	97	10	0	100	0	0	102	10	0	105	0	0	107	10	0	600,000
700,000	107	18	4	110	16	8	113	15	0	116	13	4	119	11	8	122	10	0	125	8	4	700,000
800,000	123	6	8	126	13	4	130	0	0	133	6	8	136	13	4	140	0	0	143	6	8	800,000
900,000	138	15	0	142	10	0	146	5	0	150	0	0	153	15	0	157	10	0	161	5	0	900,000
1,000,000	154	3	4	158	6	8	162	10	0	166	13	4	170	16	8	175	0	0	179	3	4	1,000,000

TABLES

Showing the Value of Gas, from 100 *to* 1,000,000 *Cubic Feet, at Given Rates.*

III.—From 3s. 8d. to 4s. 2d. per 1000 Cubic Feet.

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.																					Cubic Feet of Gas Consumed.
	3s. 8d.			3s. 9d.			3s. 10d.			3s. 11d.			4s. 0d.			4s. 1d.			4s. 2d.			
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
100	.	.	4½	.	.	4½	.	.	4½	.	.	4½	.	.	5	.	.	5	.	0	5	100
200	.	.	9	.	.	9	.	.	9	.	.	9½	.	.	9½	.	.	10	.	0	10	200
300	.	1	1	.	1	1½	.	1	2	.	1	2	.	1	2½	.	1	2½	.	1	3	300
400	.	1	5½	.	1	6	.	1	6½	.	1	7	.	1	7	.	1	7½	.	1	8	400
500	.	1	10	.	1	10½	.	1	11	.	1	11½	.	2	0	.	2	0½	.	2	1	500
600	.	2	2½	.	2	3	.	2	3½	.	2	4	.	2	5	.	2	5½	.	2	6	600
700	.	2	7	.	2	7½	.	2	8	.	2	9	.	2	9½	.	2	10½	.	2	11	700
800	.	2	11	.	3	0	.	3	1	.	3	1½	.	3	2½	.	3	3	.	3	4	800
900	.	3	3½	.	3	4½	.	3	5½	.	3	6½	.	3	7	.	3	8	.	3	9	900
1,000	.	3	8	.	3	9	.	3	10	.	3	11	.	4	0	.	4	1	.	4	2	1,000
1,100	.	4	0½	.	4	1½	.	4	2½	.	4	3½	.	4	5	.	4	6	.	4	7	1,100
1,200	.	4	5	.	4	6	.	4	7	.	4	8½	.	4	9½	.	4	11	.	5	0	1,200
1,300	.	4	9	.	4	10½	.	5	0	.	5	1	.	5	2½	.	5	3½	.	5	5	1,300
1,400	.	5	1½	.	5	3	.	5	4½	.	5	6	.	5	7	.	5	8½	.	5	10	1,400
1,500	.	5	6	.	5	7½	.	5	9	.	5	10½	.	6	0	.	6	1½	.	6	3	1,500
1,600	.	5	10½	.	6	0	.	6	1½	.	6	3	.	6	5	.	6	6½	.	6	8	1,600
1,700	.	6	3	.	6	4½	.	6	6	.	6	8	.	6	9½	.	6	11½	.	7	1	1,700
1,800	.	6	7	.	6	9	.	6	11	.	7	0½	.	7	2½	.	7	4	.	7	6	1,800
1,900	.	6	11½	.	7	1½	.	7	3½	.	7	5½	.	7	7	.	7	9	.	7	11	1,900
2,000	.	7	4	.	7	6	.	7	8	.	7	10	.	8	0	.	8	2	.	8	4	2,000
2,100	.	7	8½	.	7	10½	.	8	0½	.	8	2½	.	8	5	.	8	7	.	8	9	2,100
2,200	.	8	1	.	8	3	.	8	5	.	8	7½	.	8	9½	.	9	0	.	9	2	2,200
2,300	.	8	5	.	8	7½	.	8	10	.	9	0	.	9	2½	.	9	4½	.	9	7	2,300
2,400	.	8	9½	.	9	0	.	9	2½	.	9	5	.	9	7	.	9	9½	.	10	0	2,400
2,500	.	9	2	.	9	4½	.	9	7	.	9	9½	.	10	0	.	10	2½	.	10	5	2,500
2,600	.	9	6½	.	9	9	.	9	11½	.	10	2	.	10	5	.	10	7½	.	10	10	2,600
2,700	.	9	11	.	10	1½	.	10	4	.	10	7	.	10	9½	.	11	0½	.	11	3	2,700
2,800	.	10	3	.	10	6	.	10	9	.	10	11½	.	11	2½	.	11	5	.	11	8	2,800
2,900	.	10	7½	.	10	10½	.	11	1½	.	11	4½	.	11	7	.	11	10	.	12	1	2,900
3,000	.	11	0	.	11	3	.	11	6	.	11	9	.	12	0	.	12	3	.	12	6	3,000
3,100	.	11	4½	.	11	7½	.	11	10½	.	12	1½	.	12	5	.	12	8	.	12	11	3,100
3,200	.	11	9	.	12	0	.	12	3	.	12	6½	.	12	9½	.	13	1	.	13	4	3,200
3,300	.	12	1	.	12	4½	.	12	8	.	12	11	.	13	2½	.	13	5½	.	13	9	3,300
3,400	.	12	5½	.	12	9	.	13	0½	.	13	4	.	13	7	.	13	10½	.	14	2	3,400
3,500	.	12	10	.	13	1½	.	13	5	.	13	8½	.	14	0	.	14	3½	.	14	7	3,500
3,600	.	13	2½	.	13	6	.	13	9½	.	14	1	.	14	5	.	14	8½	.	15	0	3,600
3,700	.	13	7	.	13	10½	.	14	2	.	14	6	.	14	9½	.	15	1½	.	15	5	3,700
3,800	.	13	11	.	14	3	.	14	7	.	14	10½	.	15	2½	.	15	6	.	15	10	3,800
3,900	.	14	3½	.	14	7½	.	14	11½	.	15	3½	.	15	7	.	15	11	.	16	3	3,900
4,000	.	14	8	.	15	0	.	15	4	.	15	8	.	16	0	.	16	4	.	16	8	4,000
4,100	.	15	0½	.	15	4½	.	15	8½	.	16	0½	.	16	5	.	16	9	.	17	1	4,100
4,200	.	15	5	.	15	9	.	16	1	.	16	5½	.	16	9½	.	17	2	.	17	6	4,200
4,300	.	15	9	.	16	1½	.	16	6	.	16	10	.	17	2½	.	17	6½	.	17	11	4,300
4,400	.	16	1½	.	16	6	.	16	10½	.	17	3	.	17	7	.	17	11½	.	18	4	4,400
4,500	.	16	6	.	16	10½	.	17	3	.	17	7½	.	18	0	.	18	4½	.	18	9	4,500
4,600	.	16	10½	.	17	3	.	17	7½	.	18	0	.	18	5	.	18	9½	.	19	2	4,600
4,700	.	17	3	.	17	7½	.	18	0	.	18	5	.	18	9½	.	19	2½	.	19	7	4,700
4,800	.	17	7	.	18	0	.	18	5	.	18	9½	.	19	2½	.	19	7	1	0	0	4,800
4,900	.	17	11½	.	18	4½	.	18	9½	.	19	2½	.	19	7	1	0	0	1	0	5	4,900
5,000	.	18	4	.	18	9	.	19	2	.	19	7	1	0	0	1	0	5	1	0	10	5,000
5,100	.	18	8½	.	19	1½	.	19	6½	.	19	11½	1	0	5	1	0	10	1	1	3	5,100
5,200	.	19	1	.	19	6	.	19	11	1	0	4½	1	0	9½	1	1	3	1	1	8	5,200
5,300	.	19	5	.	19	10½	1	0	4	1	0	9	1	1	2½	1	1	7½	1	2	1	5,300
5,400	.	19	9½	1	0	3	1	0	8½	1	1	2	1	1	7	1	2	0½	1	2	6	5,400
5,500	1	0	2	1	0	7½	1	1	1	1	1	6½	1	2	0	1	2	5½	1	2	11	5,500
5,600	1	0	6½	1	1	0	1	1	5½	1	1	11	1	2	5	1	2	10½	1	3	4	5,600
5,700	1	0	11	1	1	4½	1	1	10	1	2	4	1	2	9½	1	3	3½	1	3	9	5,700
5,800	1	1	3	1	1	9	1	2	3	1	2	8½	1	3	2½	1	3	8	1	4	2	5,800
5,900	1	1	7½	1	2	1½	1	2	7½	1	3	1½	1	3	7	1	4	1	1	4	7	5,900
6,000	1	2	0	1	2	6	1	3	0	1	3	6	1	4	0	1	4	6	1	5	0	6,000
6,100	1	2	4½	1	2	10½	1	3	4½	1	3	10½	1	4	5	1	4	11	1	5	5	6,100
6,200	1	2	9	1	3	3	1	3	9	1	4	3½	1	4	9½	1	5	4	1	5	10	6,200
6,300	1	3	1	1	3	7½	1	4	2	1	4	8	1	5	2½	1	5	8½	1	6	3	6,300

III.—From 3s. 8d. to 4s. 2d. per 1000 Cubic Feet—(*continued.*)

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.																					Cubic Feet of Gas Consumed.
	3s. 8d.			3s. 9d.			3s. 10d.			3s. 11d.			4s. 0d.			4s. 1d.			4s. 2d.			
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
6,400	1	3	5½	1	4	0	1	4	6½	1	5	1	1	5	7	1	6	1½	1	6	8	6,400
6,500	1	3	10	1	4	4½	1	4	11	1	5	5½	1	6	0	1	6	6½	1	7	1	6,500
6,600	1	4	2½	1	4	9	1	5	3½	1	5	10	1	6	5	1	6	11½	1	7	6	6,600
6,700	1	4	7	1	5	1½	1	5	8	1	6	3	1	6	9½	1	7	4½	1	7	11	6,700
6,800	1	4	11	1	5	6	1	6	1	1	6	7½	1	7	2½	1	7	9	1	8	4	6,800
6,900	1	5	3½	1	5	10½	1	6	5½	1	7	0½	1	7	7	1	8	2	1	8	9	6,900
7,000	1	5	8	1	6	3	1	6	10	1	7	5	1	8	0	1	8	7	1	9	2	7,000
7,100	1	6	0½	1	6	7½	1	7	2½	1	7	9½	1	8	5	1	9	0	1	9	7	7,100
7,200	1	6	5	1	7	0	1	7	7	1	8	2½	1	8	9½	1	9	5	1	10	0	7,200
7,300	1	6	9	1	7	4½	1	8	0	1	8	7	1	9	2½	1	9	9½	1	10	5	7,300
7,400	1	7	1½	1	7	9	1	8	4½	1	9	0	1	9	7	1	10	2½	1	10	10	7,400
7,500	1	7	6	1	8	1½	1	8	9	1	9	4½	1	10	0	1	10	7½	1	11	3	7,500
7,600	1	7	10½	1	8	6	1	9	1½	1	9	9	1	10	5	1	11	0½	1	11	8	7,600
7,700	1	8	3	1	8	10½	1	9	6	1	10	2	1	10	9½	1	11	5½	1	12	1	7,700
7,800	1	8	7	1	9	3	1	9	11	1	10	6½	1	11	2½	1	11	10	1	12	6	7,800
7,900	1	8	11½	1	9	7½	1	10	3½	1	10	11½	1	11	7	1	12	3	1	12	11	7,900
8,000	1	9	4	1	10	0	1	10	8	1	11	4	1	12	0	1	12	8	1	13	4	8,000
8,100	1	9	8½	1	10	4½	1	11	0½	1	11	8½	1	12	5	1	13	1	1	13	9	8,100
8,200	1	10	1	1	10	9	1	11	5	1	12	1½	1	12	9½	1	13	6	1	14	2	8,200
8,300	1	10	5	1	11	1½	1	11	10	1	12	6	1	13	2½	1	13	10½	1	14	7	8,300
8,400	1	10	9½	1	11	6	1	12	2½	1	12	11	1	13	7	1	14	3½	1	15	0	8,400
8,500	1	11	2	1	11	10½	1	12	7	1	13	3½	1	14	0	1	14	8½	1	15	5	8,500
8,600	1	11	6½	1	12	3	1	12	11½	1	13	8	1	14	5	1	15	1½	1	15	10	8,600
8,700	1	11	11	1	12	7½	1	13	4	1	14	1	1	14	9½	1	15	6½	1	16	3	8,700
8,800	1	12	3	1	13	0	1	13	9	1	14	5½	1	15	2½	1	15	11	1	16	8	8,800
8,900	1	12	7½	1	13	4½	1	14	1½	1	14	10½	1	15	7	1	16	4	1	17	1	8,900
9,000	1	13	0	1	13	9	1	14	6	1	15	3	1	16	0	1	16	9	1	17	6	9,000
9,100	1	13	4½	1	14	1½	1	14	10½	1	15	7½	1	16	5	1	17	2	1	17	11	9,100
9,200	1	13	9	1	14	6	1	15	3	1	16	0½	1	16	9½	1	17	7	1	18	4	9,200
9,300	1	14	1	1	14	10½	1	15	8	1	16	5	1	17	2½	1	17	11½	1	18	9	9,300
9,400	1	14	5½	1	15	3	1	16	0½	1	16	10	1	17	7	1	18	4½	1	19	2	9,400
9,500	1	14	10	1	15	7½	1	16	5	1	17	2½	1	18	0	1	18	9½	1	19	7	9,500
9,600	1	15	2½	1	16	0	1	16	9½	1	17	7	1	18	5	1	19	2½	2	0	0	9,600
9,700	1	15	7	1	16	4½	1	17	2	1	18	0	1	18	9½	1	19	7½	2	0	5	9,700
9,800	1	15	11	1	16	9	1	17	7	1	18	4½	1	19	2½	2	0	0	2	0	10	9,800
9,900	1	16	3½	1	17	1½	1	17	11½	1	18	9½	1	19	7	2	0	5	2	1	3	9,900
10,000	1	16	8	1	17	6	1	18	4	1	19	2	2	0	0	2	0	10	2	1	8	10,000
11,000	2	0	4	2	1	3	2	2	2	2	3	1	2	4	0	2	4	11	2	5	10	11,000
12,000	2	4	0	2	5	0	2	6	0	2	7	0	2	8	0	2	9	0	2	10	0	12,000
13,000	2	7	8	2	8	9	2	9	10	2	10	11	2	12	0	2	13	1	2	14	2	13,000
14,000	2	11	4	2	12	6	2	13	8	2	14	10	2	16	0	2	17	2	2	18	4	14,000
15,000	2	15	0	2	16	3	2	17	6	2	18	9	3	0	0	3	1	3	3	2	6	15,000
16,000	2	18	8	3	0	0	3	1	4	3	2	8	3	4	0	3	5	4	3	6	8	16,000
17,000	3	2	4	3	3	9	3	5	2	3	6	7	3	8	0	3	9	5	3	10	10	17,000
18,000	3	6	0	3	7	6	3	9	0	3	10	6	3	12	0	3	13	6	3	15	0	18,000
19,000	3	9	8	3	11	3	3	12	10	3	14	5	3	16	0	3	17	7	3	19	2	19,000
20,000	3	13	4	3	15	0	3	16	8	3	18	4	4	0	0	4	1	8	4	3	4	20,000
21,000	3	17	0	3	18	9	4	0	6	4	2	3	4	4	0	4	5	9	4	7	6	21,000
22,000	4	0	8	4	2	6	4	4	4	4	6	2	4	8	0	4	9	10	4	11	8	22,000
23,000	4	4	4	4	6	3	4	8	2	4	10	1	4	12	0	4	13	11	4	15	10	23,000
24,000	4	8	0	4	10	0	4	12	0	4	14	0	4	16	0	4	18	0	5	0	0	24,000
25,000	4	11	8	4	13	9	4	15	10	4	17	11	5	0	0	5	2	1	5	4	2	25,000
26,000	4	15	4	4	17	6	4	19	8	5	1	10	5	4	0	5	6	2	5	8	4	26,000
27,000	4	19	0	5	1	3	5	3	6	5	5	9	5	8	0	5	10	3	5	12	6	27,000
28,000	5	2	8	5	5	0	5	7	4	5	9	8	5	12	0	5	14	4	5	16	8	28,000
29,000	5	6	4	5	8	9	5	11	2	5	13	7	5	16	0	5	18	5	6	0	10	29,000
30,000	5	10	0	5	12	6	5	15	0	5	17	6	6	0	0	6	2	6	6	5	0	30,000
31,000	5	13	8	5	16	3	5	18	10	6	1	5	6	4	0	6	6	7	6	9	2	31,000
32,000	5	17	4	6	0	0	6	2	8	6	5	4	6	8	0	6	10	8	6	13	4	32,000
33,000	6	1	0	6	3	9	6	6	6	6	9	3	6	12	0	6	14	9	6	17	6	33,000
34,000	6	4	8	6	7	6	6	10	4	6	13	2	6	16	0	6	18	10	7	1	8	34,000
35,000	6	8	4	6	11	3	6	14	2	6	17	1	7	0	0	7	2	11	7	5	10	35,000
36,000	6	12	0	6	15	0	6	18	0	7	1	0	7	4	0	7	7	0	7	10	0	36,000
37,000	6	15	8	6	18	9	7	1	10	7	4	11	7	8	0	7	11	1	7	14	2	37,000
38,000	6	19	4	7	2	6	7	5	8	7	8	10	7	12	0	7	15	2	7	18	4	38,000
39,000	7	3	0	7	6	3	7	9	6	7	12	9	7	16	0	7	19	3	8	2	6	39,000
40,000	7	6	8	7	10	0	7	13	4	7	16	8	8	0	0	8	3	4	8	6	8	40,000
41,000	7	10	4	7	13	9	7	17	2	8	0	7	8	4	0	8	7	5	8	10	10	41,000

III.—From *3s. 8d.* to *4s. 2d.* per 1000 Cubic Feet—(*continued.*)

Cubic Feet of Gas Con-sumed.	Selling Price of Gas per 1000 Cubic Feet.																					Cubic Feet of Gas Con-sumed.
	3s. 8d.			3s. 9d.			3s. 10d.			3s. 11d.			4s. 0d.			4s. 1d.			4s. 2d.			
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
42,000	7	14	0	7	17	6	8	1	0	8	4	6	8	8	0	8	11	6	8	15	0	42,000
43,000	7	17	8	8	1	3	8	4	10	8	8	5	8	12	0	8	15	7	8	19	2	43,000
44,000	8	1	4	8	5	0	8	8	8	8	12	4	8	16	0	8	19	8	9	3	4	44,000
45,000	8	5	0	8	8	9	8	12	6	8	16	3	9	0	0	9	3	9	9	7	6	45,000
46,000	8	8	8	8	12	6	8	16	4	9	0	2	9	4	0	9	7	10	9	11	8	46,000
47,000	8	12	4	8	16	3	9	0	2	9	4	1	9	8	0	9	11	11	9	15	10	47,000
48,000	8	16	0	9	0	0	9	4	0	9	8	0	9	12	0	9	16	0	10	0	0	48,000
49,000	8	19	8	9	3	9	9	7	10	9	11	11	9	16	0	10	0	1	10	4	2	49,000
50,000	9	3	4	9	7	6	9	11	8	9	15	10	10	0	0	10	4	2	10	8	4	50,000
51,000	9	7	0	9	11	3	9	15	6	9	19	9	10	4	0	10	8	3	10	12	6	51,000
52,000	9	10	8	9	15	0	9	19	4	10	3	8	10	8	0	10	12	4	10	16	8	52,000
53,000	9	14	4	9	18	9	10	3	2	10	7	7	10	12	0	10	16	5	11	0	10	53,000
54,000	9	18	0	10	2	6	10	7	0	10	11	6	10	16	0	11	0	6	11	5	0	54,000
55,000	10	1	8	10	6	3	10	10	10	10	15	5	11	0	0	11	4	7	11	9	2	55,000
56,000	10	5	4	10	10	0	10	14	8	10	19	4	11	4	0	11	8	8	11	13	4	56,000
57,000	10	9	0	10	13	9	10	18	6	11	3	3	11	8	0	11	12	9	11	17	6	57,000
58,000	10	12	8	10	17	6	11	2	4	11	7	2	11	12	0	11	16	10	12	1	8	58,000
59,000	10	16	4	11	1	3	11	6	2	11	11	1	11	16	0	12	0	11	12	5	10	59,000
60,000	11	0	0	11	5	0	11	10	0	11	15	0	12	0	0	12	5	0	12	10	0	60,000
61,000	11	3	8	11	8	9	11	13	10	11	18	11	12	4	0	12	9	1	12	14	2	61,000
62,000	11	7	4	11	12	6	11	17	8	12	2	10	12	8	0	12	13	2	12	18	4	62,000
63,000	11	11	0	11	16	3	12	1	6	12	6	9	12	12	0	12	17	3	13	2	6	63,000
64,000	11	14	8	12	0	0	12	5	4	12	10	8	12	16	0	13	1	4	13	6	8	64,000
65,000	11	18	4	12	3	9	12	9	2	12	14	7	13	0	0	13	5	5	13	10	10	65,000
66,000	12	2	0	12	7	6	12	13	0	12	18	6	13	4	0	13	9	6	13	15	0	66,000
67,000	12	5	8	12	11	3	12	16	10	13	2	5	13	8	0	13	13	7	13	19	2	67,000
68,000	12	9	4	12	15	0	13	0	8	13	6	4	13	12	0	13	17	8	14	3	4	68,000
69,000	12	13	0	12	18	9	13	4	6	13	10	3	13	16	0	14	1	9	14	7	6	69,000
70,000	12	16	8	13	2	6	13	8	4	13	14	2	14	0	0	14	5	10	14	11	8	70,000
71,000	13	0	4	13	6	3	13	12	2	13	18	1	14	4	0	14	9	11	14	15	10	71,000
72,000	13	4	0	13	10	0	13	16	0	14	2	0	14	8	0	14	14	0	15	0	0	72,000
73,000	13	7	8	13	13	9	13	19	10	14	5	11	14	12	0	14	18	1	15	4	2	73,000
74,000	13	11	4	13	17	6	14	3	8	14	9	10	14	16	0	15	2	2	15	8	4	74,000
75,000	13	15	0	14	1	3	14	7	6	14	13	9	15	0	0	15	6	3	15	12	6	75,000
76,000	13	18	8	14	5	0	14	11	4	14	17	8	15	4	0	15	10	4	15	16	8	76,000
77,000	14	2	4	14	8	9	14	15	2	15	1	7	15	8	0	15	14	5	16	0	10	77,000
78,000	14	6	0	14	12	6	14	19	0	15	5	6	15	12	0	15	18	6	16	5	0	78,000
79,000	14	9	8	14	16	3	15	2	10	15	9	5	15	16	0	16	2	7	16	9	2	79,000
80,000	14	13	4	15	0	0	15	6	8	15	13	4	16	0	0	16	6	8	16	13	4	80,000
81,000	14	17	0	15	3	9	15	10	6	15	17	3	16	4	0	16	10	9	16	17	6	81,000
82,000	15	0	8	15	7	6	15	14	4	16	1	2	16	8	0	16	14	10	17	1	8	82,000
83,000	15	4	4	15	11	3	15	18	2	16	5	1	16	12	0	16	18	11	17	5	10	83,000
84,000	15	8	0	15	15	0	16	2	0	16	9	0	16	16	0	17	3	0	17	10	0	84,000
85,000	15	11	8	15	18	9	16	5	10	16	12	11	17	0	0	17	7	1	17	14	2	85,000
86,000	15	15	4	16	2	6	16	9	8	16	16	10	17	4	0	17	11	2	17	18	4	86,000
87,000	15	19	0	16	6	3	16	13	6	17	0	9	17	8	0	17	15	3	18	2	6	87,000
88,000	16	2	8	16	10	0	16	17	4	17	4	8	17	12	0	17	19	4	18	6	8	88,000
89,000	16	6	4	16	13	9	17	1	2	17	8	7	17	16	0	18	3	5	18	10	10	89,000
90,000	16	10	0	16	17	6	17	5	0	17	12	6	18	0	0	18	7	6	18	15	0	90,000
91,000	16	13	8	17	1	3	17	8	10	17	16	5	18	4	0	18	11	7	18	19	2	91,000
92,000	16	17	4	17	5	0	17	12	8	18	0	4	18	8	0	18	15	8	19	3	4	92,000
93,000	17	1	0	17	8	9	17	16	6	18	4	3	18	12	0	18	19	9	19	7	6	93,000
94,000	17	4	8	17	12	6	18	0	4	18	8	2	18	16	0	19	3	10	19	11	8	94,000
95,000	17	8	4	17	16	3	18	4	2	18	12	1	19	0	0	19	7	11	19	15	10	95,000
96,000	17	12	0	18	0	0	18	8	0	18	16	0	19	4	0	19	12	0	20	0	0	96,000
97,000	17	15	8	18	3	9	18	11	10	18	19	11	19	8	0	19	16	1	20	4	2	97,000
98,000	17	19	4	18	7	6	18	15	8	19	3	10	19	12	0	20	0	2	20	8	4	98,000
99,000	18	3	0	18	11	3	18	19	6	19	7	9	19	16	0	20	4	3	20	12	6	99,000
100,000	18	6	8	18	15	0	19	3	4	19	11	8	20	0	0	20	8	4	20	16	8	100,000
200,000	36	13	4	37	10	0	38	6	8	39	3	4	40	0	0	40	16	8	41	13	4	200,000
300,000	55	0	0	56	5	0	57	10	0	58	15	0	60	0	0	61	5	0	62	10	0	300,000
400,000	73	6	8	75	0	0	76	13	4	78	6	8	80	0	0	81	13	4	83	6	8	400,000
500,000	91	13	4	93	15	0	95	16	8	97	18	4	100	0	0	102	1	8	104	3	4	500,000
600,000	110	0	0	112	10	0	115	0	0	117	10	0	120	0	0	122	10	0	125	0	0	600,000
700,000	128	6	8	131	5	0	134	3	4	137	1	8	140	0	0	142	18	4	145	16	8	700,000
800,000	146	13	4	150	0	0	153	6	8	156	13	4	160	0	0	163	6	8	166	13	4	800,000
900,000	165	0	0	168	15	0	172	10	0	176	5	0	180	0	0	183	15	0	187	10	0	900,000
1,000,000	183	6	8	187	10	0	191	13	4	195	16	8	200	0	0	204	3	4	208	6	8	1,000,000

TABLES

Showing the Value of Gas, from 100 *to* 1,000,000 *Cubic Feet, at Given Rates.*

IV.—From 4*s.* 3*d.* to 4*s.* 9*d.* per 1000 Cubic Feet.

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.							Cubic Feet of Gas Consumed.
	4s. 3d.	4s. 4d.	4s. 5d.	4s. 6d.	4s. 7d.	4s. 8d.	4s. 9d.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
100	. . 5	. . 5	. . 5½	. . 5½	. . 5½	. . 5½	. . 5½	100
200	. . 10	. . 10½	. . 10½	. . 11	. . 11	. . 11	. . 11½	200
300	. 1 3½	. 1 3½	. 1 4	. 1 4	. 1 4½	. 1 5	. 1 5	300
400	. 1 8½	. 1 9	. 1 9	. 1 9½	. 1 10	. 1 10½	. 1 11	400
500	. 2 1½	. 2 2	. 2 2½	. 2 3	. 2 3½	. 2 4	. 2 4½	500
600	. 2 6½	. 2 7	. 2 8	. 2 8½	. 2 9	. 2 9½	. 2 10	600
700	. 2 11½	. 3 0½	. 3 1	. 3 2	. 3 2½	. 3 3	. 3 4	700
800	. 3 5	. 3 5½	. 3 6½	. 3 7	. 3 8	. 3 9	. 3 9½	800
900	. 3 10	. 3 11	. 3 11½	. 4 0½	. 4 1½	. 4 2½	. 4 3½	900
1,000	. 4 3	. 4 4	. 4 5	. 4 6	. 4 7	. 4 8	. 4 9	1,000
1,100	. 4 8	. 4 9	. 4 10¼	. 4 11½	. 5 0½	. 5 1½	. 5 2½	1,100
1,200	. 5 1	. 5 2½	. 5 3½	. 5 5	. 5 6	. 5 7	. 5 8½	1,200
1,300	. 5 6½	. 5 7½	. 5 9	. 5 10	. 5 11½	. 6 1	. 6 2	1,300
1,400	. 5 11½	. 6 1	. 6 2	. 6 3½	. 6 5	. 6 6½	. 6 8	1,400
1,500	. 6 4½	. 6 6	. 6 7½	. 6 9	. 6 10½	. 7 0	. 7 1½	1,500
1,600	. 6 9½	. 6 11	. 7 1	. 7 2½	. 7 4	. 7 5½	. 7 7	1,600
1,700	. 7 2½	. 7 4½	. 7 6	. 7 8	. 7 9½	. 7 11	. 8 1	1,700
1,800	. 7 8	. 7 9½	. 7 11½	. 8 1	. 8 3	. 8 5	. 8 6½	1,800
1,900	. 8 1	. 8 3	. 8 4½	. 8 6½	. 8 8½	. 8 10½	. 9 0½	1,900
2,000	. 8 6	. 8 8	. 8 10	. 9 0	. 9 2	. 9 4	. 9 6	2,000
2,100	. 8 11	. 9 1	. 9 3½	. 9 5½	. 9 7½	. 9 9½	. 9 11½	2,100
2,200	. 9 4	. 9 6½	. 9 8½	. 9 11	. 10 1	. 10 3	. 10 5½	2,200
2,300	. 9 9½	. 9 11½	. 10 2	. 10 4	. 10 6½	. 10 9	. 10 11	2,300
2,400	. 10 2½	. 10 5	. 10 7	. 10 9½	. 11 0	. 11 2½	. 11 5	2,400
2,500	. 10 7½	. 10 10	. 11 0½	. 11 3	. 11 5½	. 11 8	. 11 10½	2,500
2.600	. 11 0½	. 11 3	. 11 6	. 11 8½	. 11 11	. 12 1½	. 12 4	2,600
2,700	. 11 5½	. 11 8½	. 11 11	. 12 2	. 12 4½	. 12 7	. 12 10	2,700
2,800	. 11 11	. 12 1½	. 12 4½	. 12 7	. 12 10	. 13 1	. 13 3½	2,800
2,900	. 12 4	. 12 7	. 12 9½	. 13 0½	. 13 3½	. 13 6½	. 13 9½	2,900
3,000	. 12 9	. 13 0	. 13 3	. 13 6	. 13 9	. 14 0	. 14 3	3,000
3,100	. 13 2	. 13 5	. 13 8½	. 13 11½	. 14 2½	. 14 5½	. 14 8½	3,100
3,200	. 13 7	. 13 10½	. 14 1½	. 14 5	. 14 8	. 14 11	. 15 2½	3,200
3,300	. 14 0½	. 14 3½	. 14 7	. 14 10	. 15 1½	. 15 5	. 15 8	3,300
3,400	. 14 5½	. 14 9	. 15 0	. 15 3½	. 15 7	. 15 10½	. 16 2	3,400
3,500	. 14 10½	. 15 2	. 15 5½	. 15 9	. 16 0½	. 16 4	. 16 7½	3,500
3,600	. 15 3½	. 15 7	. 15 11	. 16 2½	. 16 6	. 16 9½	. 17 1	3,600
3,700	. 15 8½	. 16 0½	. 16 4	. 16 8	. 16 11½	. 17 3	. 17 7	3,700
3,800	. 16 2	. 16 5¼	. 16 9½	. 17 1	. 17 5	. 17 9	. 18 0½	3,800
3,900	. 16 7	. 16 11	. 17 2½	. 17 6½	. 17 10½	. 18 2½	. 18 6½	3,900
4,000	. 17 0	. 17 4	17 8	. 18 0	. 18 4	. 18 8	. 19 0	4,000
4,100	. 17 5	. 17 9	. 18 1½	. 18 5½	. 18 9½	. 19 1½	. 19 5½	4,100
4,200	. 17 10	. 18 2½	. 18 6½	. 18 11	. 19 3	. 19 7	. 19 11½	4,200
4,300	. 18 3½	. 18 7½	. 19 0	. 19 4	. 19 8½	1 0 1	1 0 5	4,300
4,400	. 18 8½	. 19 1	. 19 5	. 19 9½	1 0 2	1 0 6½	1 0 11	4,400
4,500	. 19 1½	. 19 6	. 19 10½	1 0 3	1 0 7½	1 1 0	1 1 4½	4,500
4,600	. 19 6½	. 19 11	1 0 4	1 0 8½	1 1 1	1 1 5½	1 1 10	4,600
4,700	. 19 11½	1 0 4½	1 0 9	1 1 2	1 1 6½	1 1 11	1 2 4	4,700
4,800	1 0 5	1 0 9½	1 1 2½	1 1 7	1 2 0	1 2 5	1 2 9½	4,800
4,900	1 0 10	1 1 3	1 1 7½	1 2 0½	1 2 5½	1 2 10½	1 3 3½	4,900
5,000	1 1 3	1 1 8	1 2 1	1 2 6	1 2 11	1 3 4	1 3 9	5,000
5,100	1 1 8	1 2 1	1 2 6½	1 2 11½	1 3 4½	1 3 9½	1 4 2½	5,100
5,200	1 2 1	1 2 6½	1 2 11½	1 3 5	1 3 10	1 4 3	1 4 8½	5,200
5,300	1 2 6½	1 2 11½	1 3 5	1 3 10	1 4 3½	1 4 9	1 5 2	5,300
5,400	1 2 11½	1 3 5	1 3 10	1 4 3½	1 4 9	1 5 2½	1 5 8	5,400
5,500	1 3 4½	1 3 10	1 4 3½	1 4 9	1 5 2½	1 5 8	1 6 1½	5,500
5,600	1 3 9½	1 4 3	1 4 9	1 5 2½	1 5 8	1 6 1½	1 6 7	5,600
5,700	1 4 2½	1 4 8½	1 5 2	1 5 8	1 6 1½	1 6 7	1 7 1	5,700
5,800	1 4 8	1 5 1½	1 5 7½	1 6 1	1 6 7	1 7 1	1 7 6½	5,800
5,900	1 5 1	1 5 7	1 6 0½	1 6 6½	1 7 0½	1 7 6½	1 8 0½	5,900
6,000	1 5 6	1 6 0	1 6 6	1 7 0	1 7 6	1 8 0	1 8 6	6,000
6,100	1 5 11	1 6 5	1 6 11½	1 7 5½	1 7 11½	1 8 5½	1 8 11½	6,100
6,200	1 6 4	1 6 10½	1 7 4½	1 7 11	1 8 5	1 8 11	1 9 5½	6,200
6,300	1 6 9½	1 7 3½	1 7 10	1 8 4	1 8 10½	1 9 5	1 9 11	6,300

IV.—From *4s. 3d.* to *4s. 9d.* per 1000 Cubic Feet—(*continued.*)

Cubic Feet of Gas Con-sumed.	Selling Price of Gas per 1000 Cubic Feet.																					Cubic Feet of Gas Con-sumed.
	4s. 3d.			4s. 4d.			4s. 5d.			4s. 6d.			4s. 7d.			4s. 8d.			4s. 9d.			
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
6,400	1	7	2½	1	7	9	1	8	3	1	8	9½	1	9	4	1	9	10½	1	10	5	6,400
6,500	1	7	7½	1	8	2	1	8	8½	1	9	3	1	9	9½	1	10	4	1	10	10½	6,500
6,600	1	8	0½	1	8	7	1	9	2	1	9	8½	1	10	3	1	10	9½	1	11	4	6,600
6,700	1	8	5½	1	9	0½	1	9	7	1	10	2	1	10	8½	1	11	3	1	11	10	6,700
6,800	1	8	11	1	9	5½	1	10	0½	1	10	7	1	11	2	1	11	9	1	12	3½	6,800
6,900	1	9	4	1	9	11	1	10	5½	1	11	0½	1	11	7½	1	12	2½	1	12	9½	6,900
7,000	1	9	9	1	10	4	1	10	11	1	11	6	1	12	1	1	12	8	1	13	3	7,000
7,100	1	10	2	1	10	9	1	11	4	1	11	11½	1	12	6½	1	13	1½	1	13	8½	7,100
7,200	1	10	7	1	11	2½	1	11	9½	1	12	5	1	13	0	1	13	7	1	14	2½	7,200
7,300	1	11	0½	1	11	7½	1	12	3	1	12	10	1	13	5½	1	14	1	1	14	8	7,300
7,400	1	11	5½	1	12	1	1	12	8	1	13	3½	1	13	11	1	14	6½	1	15	2	7,400
7,500	1	11	10½	1	12	6	1	13	1½	1	13	9	1	14	4½	1	15	0	1	15	7½	7,500
7,600	1	12	3½	1	12	11	1	13	7	1	14	2½	1	14	10	1	15	5½	1	16	1	7,600
7,700	1	12	8½	1	13	4½	1	14	0	1	14	8	1	15	3½	1	15	11	1	16	7	7,700
7,800	1	13	2	1	13	9½	1	14	5½	1	15	1	1	15	9	1	16	5	1	17	0½	7,800
7,900	1	13	7	1	14	3	1	14	10½	1	15	6½	1	16	2½	1	16	10½	1	17	6½	7,900
8,000	1	14	0	1	14	8	1	15	4	1	16	0	1	16	8	1	17	4	1	18	0	8,000
8,100	1	14	5	1	15	1	1	15	9½	1	16	5½	1	17	1½	1	17	9½	1	18	5½	8,100
8,200	1	14	10	1	15	6½	1	16	2½	1	16	11	1	17	7	1	18	3	1	18	11½	8,200
8,300	1	15	3½	1	15	11½	1	16	8	1	17	4	1	18	0½	1	18	9	1	19	5	8,300
8,400	1	15	8½	1	16	5	1	17	1	1	17	9½	1	18	6	1	19	2½	1	19	11	8,400
8,500	1	16	1½	1	16	10	1	17	6½	1	18	3	1	18	11½	1	19	8	2	0	4½	8,500
8,600	1	16	6½	1	17	3	1	18	0	1	18	8½	1	19	5	2	0	1½	2	0	10	8,600
8,700	1	16	11½	1	17	8½	1	18	5	1	19	2	1	19	10½	2	0	7	2	1	4	8,700
8,800	1	17	5	1	18	1½	1	18	10½	1	19	7	2	0	4	2	1	1	2	1	9½	8,800
8,900	1	17	10	1	18	7	1	19	3½	2	0	0½	2	0	9½	2	1	6½	2	2	3½	8,900
9,000	1	18	3	1	19	0	1	19	9	2	0	6	2	1	3	2	2	0	2	2	9	9,000
9,100	1	18	8	1	19	5	2	0	2½	2	0	11½	2	1	8½	2	2	5½	2	3	2½	9,100
9,200	1	19	1	1	19	10½	2	0	7½	2	1	5	2	2	2	2	2	11	2	3	8½	9,200
9,300	1	19	6½	2	0	3½	2	1	1	2	1	10	2	2	7½	2	3	5	2	4	2	9,300
9,400	1	19	11½	2	0	9	2	1	6	2	2	3½	2	3	1	2	3	10½	2	4	8	9,400
9,500	2	0	4½	2	1	2	2	1	11½	2	2	9	2	3	6½	2	4	4	2	5	1½	9,500
9,600	2	0	9½	2	1	7	2	2	5	2	3	2½	2	4	0	2	4	9½	2	5	7	9,600
9,700	2	1	2½	2	2	0½	2	2	10	2	3	8	2	4	5½	2	5	3	2	6	1	9,700
9,800	2	1	8	2	2	5½	2	3	3½	2	4	1	2	4	11	2	5	9	2	6	6½	9,800
9,900	2	2	1	2	2	11	2	3	8½	2	4	6½	2	5	4½	2	6	2½	2	7	0½	9,900
10,000	2	2	6	2	3	4	2	4	2	2	5	0	2	5	10	2	6	8	2	7	6	10,000
11,000	2	6	9	2	7	8	2	8	7	2	9	6	2	10	5	2	11	4	2	12	3	11,000
12,000	2	11	0	2	12	0	2	13	0	2	14	0	2	15	0	2	16	0	2	17	0	12,000
13,000	2	15	3	2	16	4	2	17	5	2	18	6	2	19	7	3	0	8	3	1	9	13,000
14,000	2	19	6	3	0	8	3	1	10	3	3	0	3	4	2	3	5	4	3	6	6	14,000
15,000	3	3	9	3	5	0	3	6	3	3	7	6	3	8	9	3	10	0	3	11	3	15,000
16,000	3	8	0	3	9	4	3	10	8	3	12	0	3	13	4	3	14	8	3	16	0	16,000
17,000	3	12	3	3	13	8	3	15	1	3	16	6	3	17	11	3	19	4	4	0	9	17,000
18,000	3	16	6	3	18	0	3	19	6	4	1	0	4	2	6	4	4	0	4	5	6	18,000
19,000	4	0	9	4	2	4	4	3	11	4	5	6	4	7	1	4	8	8	4	10	3	19,000
20,000	4	5	0	4	6	8	4	8	4	4	10	0	4	11	8	4	13	4	4	15	0	20,000
21,000	4	9	3	4	11	0	4	12	9	4	14	6	4	16	3	4	18	0	4	19	9	21,000
22,000	4	13	6	4	15	4	4	17	2	4	19	0	5	0	10	5	2	8	5	4	6	22,000
23,000	4	17	9	4	19	8	5	1	7	5	3	6	5	5	5	5	7	4	5	9	3	23,000
24,000	5	2	0	5	4	0	5	6	0	5	8	0	5	10	0	5	12	0	5	14	0	24,000
25,000	5	6	3	5	8	4	5	10	5	5	12	6	5	14	7	5	16	8	5	18	9	25,000
26,000	5	10	6	5	12	8	5	14	10	5	17	0	5	19	2	6	1	4	6	3	6	26,000
27,000	5	14	9	5	17	0	5	19	3	6	1	6	6	3	9	6	6	0	6	8	3	27,000
28,000	5	19	0	6	1	4	6	3	8	6	6	0	6	8	4	6	10	8	6	13	0	28,000
29,000	6	3	3	6	5	8	6	8	1	6	10	6	6	12	11	6	15	4	6	17	9	29,000
30,000	6	7	6	6	10	0	6	12	6	6	15	0	6	17	6	7	0	0	7	2	6	30,000
31,000	6	11	9	6	14	4	6	16	11	6	19	6	7	2	1	7	4	8	7	7	3	31,000
32,000	6	16	0	6	18	8	7	1	4	7	4	0	7	6	8	7	9	4	7	12	0	32,000
33,000	7	0	3	7	3	0	7	5	9	7	8	6	7	11	3	7	14	0	7	16	9	33,000
34,000	7	4	6	7	7	4	7	10	2	7	13	0	7	15	10	7	18	8	8	1	6	34,000
35,000	7	8	9	7	11	8	7	14	7	7	17	6	8	0	5	8	3	4	8	6	3	35,000
36,000	7	13	0	7	16	0	7	19	0	8	2	0	8	5	0	8	8	0	8	11	0	36,000
37,000	7	17	3	8	0	4	8	3	5	8	6	6	8	9	7	8	12	8	8	15	9	37,000
38,000	8	1	6	8	4	8	8	7	10	8	11	0	8	14	2	8	17	4	9	0	6	38,000
39,000	8	5	9	8	9	0	8	12	3	8	15	6	8	18	9	9	2	0	9	5	3	39,000
40,000	8	10	0	8	13	4	8	16	8	9	0	0	9	3	4	9	6	8	9	10	0	40,000
41,000	8	14	3	8	17	8	9	1	1	9	4	6	9	7	11	9	11	4	9	14	9	41,000

IV.—From 4*s*. 3*d*. to 4*s*. 9*d*. per 1000 Cubic Feet—(*continued.*)

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet. 4s. 3d.			4s. 4d.			4s. 5d.			4s. 6d.			4s. 7d.			4s. 8d.			4s. 9d.			Cubic Feet of Gas Consumed.
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
42,000	8	18	6	9	2	0	9	5	6	9	9	0	9	12	6	9	16	0	9	19	6	42,000
43,000	9	2	9	9	6	4	9	9	11	9	13	6	9	17	1	10	0	8	10	4	3	43,000
44,000	9	7	0	9	10	8	9	14	4	9	18	0	10	1	8	10	5	4	10	9	0	44,000
45,000	9	11	3	9	15	0	9	18	9	10	2	6	10	6	3	10	10	0	10	13	9	45,000
46,000	9	15	6	9	19	4	10	3	2	10	7	0	10	10	10	10	14	8	10	18	6	46,000
47,000	9	19	9	10	3	8	10	7	7	10	11	6	10	15	5	10	19	4	11	3	3	47,000
48,000	10	4	0	10	8	0	10	12	0	10	16	0	11	0	0	11	4	0	11	8	0	48,000
49,000	10	8	3	10	12	4	10	16	5	11	0	6	11	4	7	11	8	8	11	12	9	49,000
50,000	10	12	6	10	16	8	11	0	10	11	5	0	11	9	2	11	13	4	11	17	6	50,000
51,000	10	16	9	11	1	0	11	5	3	11	9	6	11	13	9	11	18	0	12	2	3	51,000
52,000	11	1	0	11	5	4	11	9	8	11	14	0	11	18	4	12	2	8	12	7	0	52,000
53,000	11	5	3	11	9	8	11	14	1	11	18	6	12	2	11	12	7	4	12	11	9	53,000
54,000	11	9	6	11	14	0	11	18	6	12	3	0	12	7	6	12	12	0	12	16	6	54,000
55,000	11	13	9	11	18	4	12	2	11	12	7	6	12	12	1	12	16	8	13	1	3	55,000
56,000	11	18	0	12	2	8	12	7	4	12	12	0	12	16	8	13	1	4	13	6	0	56,000
57,000	12	2	3	12	7	0	12	11	9	12	16	6	13	1	3	13	6	0	13	10	9	57,000
58,000	12	6	6	12	11	4	12	16	2	13	1	0	13	5	10	13	10	8	13	15	6	58,000
59,000	12	10	9	12	15	8	13	0	7	13	5	6	13	10	5	13	15	4	14	0	3	59,000
60,000	12	15	0	13	0	0	13	5	0	13	10	0	13	15	0	14	0	0	14	5	0	60,000
61,000	12	19	3	13	4	4	13	9	5	13	14	6	13	19	7	14	4	8	14	9	9	61,000
62,000	13	3	6	13	8	8	13	13	10	13	19	0	14	4	2	14	9	4	14	14	6	62,000
63,000	13	7	9	13	13	0	13	18	3	14	3	6	14	8	9	14	14	0	14	19	3	63,000
64,000	13	12	0	13	17	4	14	2	8	14	8	0	14	13	4	14	18	8	15	4	0	64,000
65,000	13	16	3	14	1	8	14	7	1	14	12	6	14	17	11	15	3	4	15	8	9	65,000
66,000	14	0	6	14	6	0	14	11	6	14	17	0	15	2	6	15	8	0	15	13	6	66,000
67,000	14	4	9	14	10	4	14	15	11	15	1	6	15	7	1	15	12	8	15	18	3	67,000
68,000	14	9	0	14	14	8	15	0	4	15	6	0	15	11	8	15	17	4	16	3	0	68,000
69,000	14	13	3	14	19	0	15	4	9	15	10	6	15	16	3	16	2	0	16	7	9	69,000
70,000	14	17	6	15	3	4	15	9	2	15	15	0	16	0	10	16	6	8	16	12	6	70,000
71,000	15	1	9	15	7	8	15	13	7	15	19	6	16	5	5	16	11	4	16	17	3	71,000
72,000	15	6	0	15	12	0	15	18	0	16	4	0	16	10	0	16	16	0	17	2	0	72,000
73,000	15	10	3	15	16	4	16	2	5	16	8	6	16	14	7	17	0	8	17	6	9	73,000
74,000	15	14	6	16	0	8	16	6	10	16	13	0	16	19	2	17	5	4	17	11	6	74,000
75,000	15	18	9	16	5	0	16	11	3	16	17	6	17	3	9	17	10	0	17	16	3	75,000
76,000	16	3	0	16	9	4	16	15	8	17	2	0	17	8	4	17	14	8	18	1	0	76,000
77,000	16	7	3	16	13	8	17	0	1	17	6	6	17	12	11	17	19	4	18	5	9	77,000
78,000	16	11	6	16	18	0	17	4	6	17	11	0	17	17	6	18	4	0	18	10	6	78,000
79,000	16	15	9	17	2	4	17	8	11	17	15	6	18	2	1	18	8	8	18	15	3	79,000
80,000	17	0	0	17	6	8	17	13	4	18	0	0	18	6	8	18	13	4	19	0	0	80,000
81,000	17	4	3	17	11	0	17	17	9	18	4	6	18	11	3	18	18	0	19	4	9	81,000
82,000	17	8	6	17	15	4	18	2	2	18	9	0	18	15	10	19	2	8	19	9	6	82,000
83,000	17	12	9	17	19	8	18	6	7	18	13	6	19	0	5	19	7	4	19	14	3	83,000
84,000	17	17	0	18	4	0	18	11	0	18	18	0	19	5	0	19	12	0	19	19	0	84,000
85,000	18	1	3	18	8	4	18	15	5	19	2	6	19	9	7	19	16	8	20	3	9	85,000
86,000	18	5	6	18	12	8	18	19	10	19	7	0	19	14	2	20	1	4	20	8	6	86,000
87,000	18	9	9	18	17	0	19	4	3	19	11	6	19	18	9	20	6	0	20	13	3	87,000
88,000	18	14	0	19	1	4	19	8	8	19	16	0	20	3	4	20	10	8	20	18	0	88,000
89,000	18	18	3	19	5	8	19	13	1	20	0	6	20	7	11	20	15	4	21	2	9	89,000
90,000	19	2	6	19	10	0	19	17	6	20	5	0	20	12	6	21	0	0	21	7	6	90,000
91,000	19	6	9	19	14	4	20	1	11	20	9	6	20	17	1	21	4	8	21	12	3	91,000
92,000	19	11	0	19	18	8	20	6	4	20	14	0	21	1	8	21	9	4	21	17	0	92,000
93,000	19	15	3	20	3	0	20	10	9	20	18	6	21	6	3	21	14	0	22	1	9	93,000
94,000	19	19	6	20	7	4	20	15	2	21	3	0	21	10	10	21	18	8	22	6	6	94,000
95,000	20	3	9	20	11	8	20	19	7	21	7	6	21	15	5	22	3	4	22	11	3	95,000
96,000	20	8	0	20	16	0	21	4	0	21	12	0	22	0	0	22	8	0	22	16	0	96,000
97,000	20	12	3	21	0	4	21	8	5	21	16	6	22	4	7	22	12	8	23	0	9	97,000
98,000	20	16	6	21	4	8	21	12	10	22	1	0	22	9	2	22	17	4	23	5	6	98,000
99,000	21	0	9	21	9	0	21	17	3	22	5	6	22	13	9	23	2	0	23	10	3	99,000
100,000	21	5	0	21	13	4	22	1	8	22	10	0	22	18	4	23	6	8	23	15	0	100,000
200,000	42	10	0	43	6	8	44	3	4	45	0	0	45	16	8	46	13	4	47	10	0	200,000
300,000	63	15	0	65	0	0	66	5	0	67	10	0	68	15	0	70	0	0	71	5	0	300,000
400,000	85	0	0	86	13	4	88	6	8	90	0	0	91	13	4	93	6	8	95	0	0	400,000
500,000	106	5	0	108	6	8	110	8	4	112	10	0	114	11	8	116	13	4	118	15	0	500,000
600,000	127	10	0	130	0	0	132	10	0	135	0	0	137	10	0	140	0	0	142	10	0	600,000
700,000	148	15	0	151	13	4	154	11	8	157	10	0	160	8	4	163	6	8	166	5	0	700,000
800,000	170	0	0	173	6	8	176	13	4	180	0	0	183	6	8	186	13	4	190	0	0	800,000
900,000	191	5	0	195	0	0	198	15	0	202	10	0	206	5	0	210	0	0	213	15	0	900,000
1,000,000	212	10	0	216	13	4	220	16	8	225	0	0	229	3	4	233	6	8	237	10	0	1,000,000

TABLES

Showing the Value of Gas, from 100 *to* 1,000,000 *Cubic Feet, at Given Rates.*

V.—From 4s. 10d. to 5s. 4d. per 1000 Cubic Feet.

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.							Cubic Feet of Gas Consumed.
	4s. 10d.	4s. 11d.	5s. 0d.	5s. 1d.	5s. 2d.	5s. 3d.	5s. 4d.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
100	. . 6	. . 6	. . 6	. . 6	. . 6	. . 6½	. . 6½	100
200	. . 11½	. 1 0	. 1 0	. 1 0	. 1 0½	. 1 0½	. 1 1	200
300	. 1 5½	. 1 5½	. 1 6	. 1 6½	. 1 6½	. 1 7	. 1 7	300
400	. 1 11	. 1 11½	. 2 0	. 2 0½	. 2 1	. 2 1	. 2 1½	400
500	. 2 5	. 2 5½	. 2 6	. 2 6½	. 2 7	. 2 7½	. 2 8	500
600	. 2 11	. 2 11½	. 3 0	. 3 0½	. 3 1	. 3 2	. 3 2½	600
700	. 3 4½	. 3 5½	. 3 6	. 3 6½	. 3 7½	. 3 8	. 3 9	700
800	. 3 10½	. 3 11	. 4 0	. 4 1	. 4 1½	. 4 2½	. 4 3	800
900	. 4 4	. 4 5	. 4 6	. 4 7	. 4 8	. 4 8½	. 4 9½	900
1,000	. 4 10	. 4 11	. 5 0	. 5 1	. 5 2	. 5 3	. 5 4	1,000
1,100	. 5 4	. 5 5	. 5 6	. 5 7	. 5 8	. 5 9½	. 5 10½	1,100
1,200	. 5 9½	. 5 11	. 6 0	. 6 1	. 6 2½	. 6 3½	. 6 5	1,200
1,300	. 6 3½	. 6 4½	. 6 6	. 6 7½	. 6 8½	. 6 10	. 6 11	1,300
1,400	. 6 9	. 6 10½	. 7 0	. 7 1½	. 7 3	. 7 4	. 7 5½	1,400
1,500	. 7 3	. 7 4½	. 7 6	. 7 7½	. 7 9	. 7 10½	. 8 0	1,500
1,600	. 7 9	. 7 10½	. 8 0	. 8 1½	. 8 3	. 8 5	. 8 6½	1,600
1,700	. 8 2½	. 8 4½	. 8 6	. 8 7½	. 8 9½	. 8 11	. 9 1	1,700
1,800	. 8 8½	. 8 10	. 9 0	. 9 2	. 9 3½	. 9 5½	. 9 7	1,800
1,900	. 9 2	. 9 4	. 9 6	. 9 8	. 9 10	. 9 11½	. 10 1½	1,900
2,000	. 9 8	. 9 10	. 10 0	. 10 2	. 10 4	. 10 6	. 10 8	2,000
2,100	. 10 2	. 10 4	. 10 6	. 10 8	. 10 10	. 11 0½	. 11 2½	2,100
2,200	. 10 7½	. 10 10	. 11 0	. 11 2	. 11 4½	. 11 6½	. 11 9	2,200
2,300	. 11 1½	. 11 3½	. 11 6	. 11 8½	. 11 10½	. 12 1	. 12 3	2,300
2,400	. 11 7	. 11 9½	. 12 0	. 12 2½	. 12 5	. 12 7	. 12 9½	2,400
2,500	. 12 1	. 12 3½	. 12 6	. 12 8½	. 12 11	. 13 1½	. 13 4	2,500
2,600	. 12 7	. 12 9½	. 13 0	. 13 2½	. 13 5	. 13 8	. 13 10½	2,600
2,700	. 13 0½	. 13 3½	. 13 6	. 13 8½	. 13 11½	. 14 2	. 14 5	2,700
2,800	. 13 6½	. 13 9	. 14 0	. 14 3	. 14 5½	. 14 8½	. 14 11	2,800
2,900	. 14 0	. 14 3	. 14 6	. 14 9	. 15 0	. 15 2½	. 15 5½	2,900
3,000	. 14 6	. 14 9	. 15 0	. 15 3	. 15 6	. 15 9	. 16 0	3,000
3,100	. 15 0	. 15 3	. 15 6	. 15 9	. 16 0	. 16 3½	. 16 6½	3,100
3,200	. 15 5½	. 15 9	. 16 0	. 16 3	. 16 6½	. 16 9½	. 17 1	3,200
3,300	. 15 11½	. 16 2½	. 16 6	. 16 9½	. 17 0½	. 17 4	. 17 7	3,300
3,400	. 16 5	. 16 8½	. 17 0	. 17 3½	. 17 7	. 17 10	. 18 1½	3,400
3,500	. 16 11	. 17 2½	. 17 6	. 17 9½	. 18 1	. 18 4½	. 18 8	3,500
3,600	. 17 5	. 17 8½	. 18 0	. 18 3½	. 18 7	. 18 11	. 19 2½	3,600
3,700	. 17 10½	. 18 2½	. 18 6	. 18 9½	. 19 1½	. 19 5	. 19 9	3,700
3,800	. 18 4½	. 18 8	. 19 0	. 19 4	. 19 7½	. 19 11½	1 0 3	3,800
3,900	. 18 10	. 19 2	. 19 6	. 19 10	1 0 2	1 0 5½	1 0 9½	3,900
4,000	. 19 4	. 19 8	1 0 0	1 0 4	1 0 8	1 1 0	1 1 4	4,000
4,100	. 19 10	1 0 2	1 0 6	1 0 10	1 1 2	1 1 6½	1 1 10½	4,100
4,200	1 0 3½	1 0 8	1 1 0	1 1 4	1 1 8½	1 2 0½	1 2 5	4,200
4,300	1 0 9½	1 1 1½	1 1 6	1 1 10½	1 2 2½	1 2 7	1 2 11	4,300
4,400	1 1 3	1 1 7½	1 2 0	1 2 4½	1 2 9	1 3 1	1 3 5½	4,400
4,500	1 1 9	1 2 1½	1 2 6	1 2 10½	1 3 3	1 3 7½	1 4 0	4,500
4,600	1 2 3	1 2 7½	1 3 0	1 3 4½	1 3 9	1 4 2	1 4 6½	4,600
4,700	1 2 8½	1 3 1½	1 3 6	1 3 10½	1 4 3½	1 4 8	1 5 1	4,700
4,800	1 3 2½	1 3 7	1 4 0	1 4 5	1 4 9½	1 5 2½	1 5 7	4,800
4,900	1 3 8	1 4 1	1 4 6	1 4 11	1 5 4	1 5 8½	1 6 1½	4,900
5,000	1 4 2	1 4 7	1 5 0	1 5 5	1 5 10	1 6 3	1 6 8	5,000
5,100	1 4 8	1 5 1	1 5 6	1 5 11	1 6 4	1 6 9½	1 7 2½	5,100
5,200	1 5 1½	1 5 7	1 6 0	1 6 5	1 6 10½	1 7 3½	1 7 9	5,200
5,300	1 5 7½	1 6 0½	1 6 6	1 6 11½	1 7 4½	1 7 10	1 8 3	5,300
5,400	1 6 1	1 6 6½	1 7 0	1 7 5½	1 7 11	1 8 4	1 8 9½	5,400
5,500	1 6 7	1 7 0½	1 7 6	1 7 11½	1 8 5	1 8 10½	1 9 4	5,500
5,600	1 7 1	1 7 6½	1 8 0	1 8 5½	1 8 11	1 9 5	1 9 10½	5,600
5,700	1 7 6½	1 8 0½	1 8 6	1 8 11½	1 9 5½	1 9 11	1 10 5	5,700
5,800	1 8 0½	1 8 6	1 9 0	1 9 6	1 9 11½	1 10 5½	1 10 11	5,800
5,900	1 8 6	1 9 0	1 9 6	1 10 0	1 10 6	1 10 11½	1 11 5½	5,900
6,000	1 9 0	1 9 6	1 10 0	1 10 6	1 11 0	1 11 6	1 12 0	6,000
6,100	1 9 6	1 10 0	1 10 6	1 11 0	1 11 6	1 12 0½	1 12 6½	6,100
6,200	1 9 11½	1 10 6	1 11 0	1 11 6	1 12 0½	1 12 6½	1 13 1	6,200
6,300	1 10 5½	1 10 11½	1 11 6	1 12 0½	1 12 6½	1 13 1	1 13 7	6,300

V.—From 4s. 10d. to 5s. 4d. per 1000 Cubic Feet—(*continued.*)

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.																					Cubic Feet of Gas Consumed.
	4s. 10d.			4s. 11d.			5s. 0d.			5s. 1d.			5s. 2d.			5s. 3d.			5s. 4d.			
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
6,400	1	10	11	1	11	5½	1	12	0	1	12	6½	1	13	1	1	13	7	1	14	1½	6,400
6,500	1	11	5	1	11	11½	1	12	6	1	13	0½	1	13	7	1	14	1½	1	14	8	6,500
6,600	1	11	11	1	12	5½	1	13	0	1	13	6½	1	14	1	1	14	8	1	15	2½	6,600
6,700	1	12	4½	1	12	11½	1	13	6	1	14	0½	1	14	7½	1	15	2	1	15	9	6,700
6,800	1	12	10½	1	13	5	1	14	0	1	14	7	1	15	1½	1	15	8½	1	16	3	6,800
6,900	1	13	4	1	13	11	1	14	6	1	15	1	1	15	8	1	16	2½	1	16	9½	6,900
7,000	1	13	10	1	14	5	1	15	0	1	15	7	1	16	2	1	16	9	1	17	4	7,000
7,100	1	14	4	1	14	11	1	15	6	1	16	1	1	16	8	1	17	3½	1	17	10½	7,100
7,200	1	14	9½	1	15	5	1	16	0	1	16	7	1	17	2½	1	17	9½	1	18	5	7,200
7,300	1	15	3½	1	15	10½	1	16	6	1	17	1½	1	17	8½	1	18	4	1	18	11	7,300
7,400	1	15	9	1	16	4½	1	17	0	1	17	7½	1	18	3	1	18	10	1	19	5½	7,400
7,500	1	16	3	1	16	10½	1	17	6	1	18	1½	1	18	9	1	19	4½	2	0	0	7,500
7,600	1	16	9	1	17	4½	1	18	0	1	18	7½	1	19	3	1	19	11	2	0	6½	7,600
7,700	1	17	2½	1	17	10½	1	18	6	1	19	1½	1	19	9½	2	0	5	2	1	1	7,700
7,800	1	17	8½	1	18	4	1	19	0	1	19	8	2	0	3½	2	0	11½	2	1	7	7,800
7,900	1	18	2	1	18	10	1	19	6	2	0	2	2	0	10	2	1	5½	2	2	1½	7,900
8,000	1	18	8	1	19	4	2	0	0	2	0	8	2	1	4	2	2	0	2	2	8	8,000
8,100	1	19	2	1	19	10	2	0	6	2	1	2	2	1	10	2	2	6½	2	3	2½	8,100
8,200	1	19	7½	2	0	4	2	1	0	2	1	8	2	2	4½	2	3	0½	2	3	9	8,200
8,300	2	0	1½	2	0	9½	2	1	6	2	2	2½	2	2	10½	2	3	7	2	4	3	8,300
8,400	2	0	7	2	1	3½	2	2	0	2	2	8½	2	3	5	2	4	1	2	4	9½	8,400
8,500	2	1	1	2	1	9½	2	2	6	2	3	2½	2	3	11	2	4	7½	2	5	4	8,500
8,600	2	1	7	2	2	3½	2	3	0	2	3	8½	2	4	5	2	5	2	2	5	10½	8,600
8,700	2	2	0½	2	2	9½	2	3	6	2	4	2½	2	4	11½	2	5	8	2	6	5	8,700
8,800	2	2	6½	2	3	3	2	4	0	2	4	9	2	5	5½	2	6	2½	2	6	11	8,800
8,900	2	3	0	2	3	9	2	4	6	2	5	3	2	6	0	2	6	8½	2	7	5½	8,900
9,000	2	3	6	2	4	3	2	5	0	2	5	9	2	6	6	2	7	3	2	8	0	9,000
9,100	2	4	0	2	4	9	2	5	6	2	6	3	2	7	0	2	7	9½	2	8	6½	9,100
9,200	2	4	5½	2	5	3	2	6	0	2	6	9	2	7	6½	2	8	3½	2	9	1	9,200
9,300	2	4	11½	2	5	8½	2	6	6	2	7	3½	2	8	0½	2	8	10	2	9	7	9,300
9,400	2	5	5	2	6	2½	2	7	0	2	7	9½	2	8	7	2	9	4	2	10	1½	9,400
9,500	2	5	11	2	6	8½	2	7	6	2	8	3½	2	9	1	2	9	10½	2	10	8	9,500
9,600	2	6	5	2	7	2½	2	8	0	2	8	9½	2	9	7	2	10	5	2	11	2½	9,600
9,700	2	6	10½	2	7	8½	2	8	6	2	9	3½	2	10	1½	2	10	11	2	11	9	9,700
9,800	2	7	4½	2	8	2	2	9	0	2	9	10	2	10	7½	2	11	5½	2	12	3	9,800
9,900	2	7	10	2	8	8	2	9	6	2	10	4	2	11	2	2	11	11½	2	12	9½	9,900
10,000	2	8	4	2	9	2	2	10	0	2	10	10	2	11	8	2	12	6	2	13	4	10,000
11,000	2	13	2	2	14	1	2	15	0	2	15	11	2	16	10	2	17	9	2	18	8	11,000
12,000	2	18	0	2	19	0	3	0	0	3	1	0	3	2	0	3	3	0	3	4	0	12,000
13,000	3	2	10	3	3	11	3	5	0	3	6	1	3	7	2	3	8	3	3	9	4	13,000
14,000	3	7	8	3	8	10	3	10	0	3	11	2	3	12	4	3	13	6	3	14	8	14,000
15,000	3	12	6	3	13	9	3	15	0	3	16	3	3	17	6	3	18	9	4	0	0	15,000
16,000	3	17	4	3	18	8	4	0	0	4	1	4	4	2	8	4	4	0	4	5	4	16,000
17,000	4	2	2	4	3	7	4	5	0	4	6	5	4	7	10	4	9	3	4	10	8	17,000
18,000	4	7	0	4	8	6	4	10	0	4	11	6	4	13	0	4	14	6	4	16	0	18,000
19,000	4	11	10	4	13	5	4	15	0	4	16	7	4	18	2	4	19	9	5	1	4	19,000
20,000	4	16	8	4	18	4	5	0	0	5	1	8	5	3	4	5	5	0	5	6	8	20,000
21,000	5	1	6	5	3	3	5	5	0	5	6	9	5	8	6	5	10	3	5	12	0	21,000
22,000	5	6	4	5	8	2	5	10	0	5	11	10	5	13	8	5	15	6	5	17	4	22,000
23,000	5	11	2	5	13	1	5	15	0	5	16	11	5	18	10	6	0	9	6	2	8	23,000
24,000	5	16	0	5	18	0	6	0	0	6	2	0	6	4	0	6	6	0	6	8	0	24,000
25,000	6	0	10	6	2	11	6	5	0	6	7	1	6	9	2	6	11	3	6	13	4	25,000
26,000	6	5	8	6	7	10	6	10	0	6	12	2	6	14	4	6	16	6	6	18	8	26,000
27,000	6	10	6	6	12	9	6	15	0	6	17	3	6	19	6	7	1	9	7	4	0	27,000
28,000	6	15	4	6	17	8	7	0	0	7	2	4	7	4	8	7	7	0	7	9	4	28,000
29,000	7	0	2	7	2	7	7	5	0	7	7	5	7	9	10	7	12	3	7	14	8	29,000
30,000	7	5	0	7	7	6	7	10	0	7	12	6	7	15	0	7	17	6	8	0	0	30,000
31,000	7	9	10	7	12	5	7	15	0	7	17	7	8	0	2	8	2	9	8	5	4	31,000
32,000	7	14	8	7	17	4	8	0	0	8	2	8	8	5	4	8	8	0	8	10	8	32,000
33,000	7	19	6	8	2	3	8	5	0	8	7	9	8	10	6	8	13	3	8	16	0	33,000
34,000	8	4	4	8	7	2	8	10	0	8	12	10	8	15	8	8	18	6	9	1	4	34,000
35,000	8	9	2	8	12	1	8	15	0	8	17	11	9	0	10	9	3	9	9	6	8	35,000
36,000	8	14	0	8	17	0	9	0	0	9	3	0	9	6	0	9	9	0	9	12	0	36,000
37,000	8	18	10	9	1	11	9	5	0	9	8	1	9	11	2	9	14	3	9	17	4	37,000
38,000	9	3	8	9	6	10	9	10	0	9	13	2	9	16	4	9	19	6	10	2	8	38,000
39,000	9	8	6	9	11	9	9	15	0	9	18	3	10	1	6	10	4	9	10	8	0	39,000
40,000	9	13	4	9	16	8	10	0	0	10	3	4	10	6	8	10	10	0	10	13	4	40,000
41,000	9	18	2	10	1	7	10	5	0	10	8	5	10	11	10	10	15	3	10	18	8	41,000

V.—From 4*s*. 10*d*. to 5*s*. 4*d*. per 1000 Cubic Feet—(*continued*.)

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.																					Cubic Feet of Gas Consumed.
	4s. 10d.			4s. 11d.			5s. 0d.			5s. 1d.			5s 2d.			5s. 3d.			5s. 4d.			
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
42,000	10	3	0	10	6	6	10	10	0	10	13	6	10	17	0	11	0	6	11	4	0	42,000
43,000	10	7	10	10	11	5	10	15	0	10	18	7	11	2	2	11	5	9	11	9	4	43,000
44,000	10	12	8	10	16	4	11	0	0	11	3	8	11	7	4	11	11	0	11	14	8	44,000
45,000	10	17	6	11	1	3	11	5	0	11	8	9	11	12	6	11	16	3	12	0	0	45,000
46,000	11	2	4	11	6	2	11	10	0	11	13	10	11	17	8	12	1	6	12	5	4	46,000
47,000	11	7	2	11	11	1	11	15	0	11	18	11	12	2	10	12	6	9	12	10	8	47,000
48,000	11	12	0	11	16	0	12	0	0	12	4	0	12	8	0	12	12	0	12	16	0	48,000
49,000	11	16	10	12	0	11	12	5	0	12	9	1	12	13	2	12	17	3	13	1	4	49,000
50,000	12	1	8	12	5	10	12	10	0	12	14	2	12	18	4	13	2	6	13	6	8	50,000
51,000	12	6	6	12	10	9	12	15	0	12	19	3	15	3	6	13	7	9	13	12	0	51,000
52,000	12	11	4	12	15	8	13	0	0	13	4	4	13	8	8	13	13	0	13	17	4	52,000
53,000	12	16	2	13	0	7	13	5	0	13	9	5	13	13	10	13	18	3	14	2	8	53,000
54,000	13	1	0	13	5	6	13	10	0	13	14	6	13	19	0	14	3	6	14	8	0	54,000
55,000	13	5	10	13	10	5	13	15	0	13	19	7	14	4	2	14	8	9	14	13	4	55,000
56,000	13	10	8	13	15	4	14	0	0	14	4	8	14	9	4	14	14	0	14	18	8	56,000
57,000	13	15	6	14	0	3	14	5	0	14	9	9	14	14	6	14	19	3	15	4	0	57,000
58,000	14	0	4	14	5	2	14	10	0	14	14	10	14	19	8	15	4	6	15	9	4	58,000
59,000	14	5	2	14	10	1	14	15	0	14	19	11	15	4	10	15	9	9	15	14	8	59,000
60,000	14	10	0	14	15	0	15	0	0	15	5	0	15	10	0	15	15	0	16	0	0	60,000
61,000	14	14	10	14	19	11	15	5	0	15	10	1	15	15	2	16	0	3	16	5	4	61,000
62,000	14	19	8	15	4	10	15	10	0	15	15	2	16	0	4	16	5	6	16	10	8	62,000
63,000	15	4	6	15	9	9	15	15	0	16	0	3	16	5	6	10	16	9	16	16	0	63,000
64,000	15	9	4	15	14	8	16	0	0	16	5	4	16	10	8	16	16	0	17	1	4	64,000
65,000	15	14	2	15	19	7	16	5	0	16	10	5	16	15	10	17	1	3	17	6	8	65,000
66,000	15	19	0	16	4	6	16	10	0	16	15	6	17	1	0	17	6	6	17	12	0	66,000
67,000	16	3	10	16	9	5	16	15	0	17	0	7	17	6	2	17	11	9	17	17	4	67,000
68,000	16	8	8	16	14	4	17	0	0	17	5	8	17	11	4	17	17	0	18	2	8	68,000
69,000	16	13	6	16	19	3	17	5	0	17	10	9	17	16	6	18	2	3	18	8	0	69,000
70,000	16	18	4	17	4	2	17	10	0	17	15	10	18	1	8	18	7	6	18	13	4	70,000
71,000	17	3	2	17	9	1	17	15	0	18	0	11	18	6	10	18	12	9	18	18	8	71,000
72,000	17	8	0	17	14	0	18	0	0	18	6	0	18	12	0	18	18	0	19	4	0	72,000
73,000	17	12	10	17	18	11	18	5	0	18	11	1	18	17	2	19	3	3	19	9	4	73,000
74,000	17	17	8	18	3	10	18	10	0	18	16	2	19	2	4	19	8	6	19	14	8	74,000
75,000	18	2	6	18	8	9	18	15	0	19	1	3	19	7	6	19	13	9	20	0	0	75,000
76,000	18	7	4	18	13	8	19	0	0	19	6	4	19	12	8	19	19	0	20	5	4	76,000
77,000	18	12	2	18	18	7	19	5	0	19	11	5	19	17	10	20	4	3	20	10	8	77,000
78,000	18	17	0	19	3	6	19	10	0	19	16	6	20	3	0	20	9	6	20	16	0	78,000
79,000	19	1	10	19	8	5	19	15	0	20	1	7	20	8	2	20	14	9	21	1	4	79,000
80,000	19	6	8	19	13	4	20	0	0	20	6	8	20	13	4	21	0	0	21	6	8	80,000
81,000	19	11	6	19	18	3	20	5	0	20	11	9	20	18	6	21	5	3	21	12	0	81,000
82,000	19	16	4	20	3	2	20	10	0	20	16	10	21	3	8	21	10	6	21	17	4	82,000
83,000	20	1	2	20	8	1	20	15	0	21	1	11	21	8	10	21	15	9	22	2	8	83,000
84,000	20	6	0	20	13	0	21	0	0	21	7	0	21	14	0	22	1	0	22	8	0	84,000
85,000	20	10	10	20	17	11	21	5	0	21	12	1	21	19	2	22	6	3	22	13	4	85,000
86,000	20	15	8	21	2	10	21	10	0	21	17	2	22	4	4	22	11	6	22	18	8	86,000
87,000	21	0	6	21	7	9	21	15	0	22	2	3	22	9	6	22	16	9	23	4	0	87,000
88,000	21	5	4	21	12	8	22	0	0	22	7	4	22	14	8	23	2	0	23	9	4	88,000
89,000	21	10	2	21	17	7	22	5	0	22	12	5	22	19	10	23	7	3	23	14	8	89,000
90,000	21	15	0	22	2	6	22	10	0	22	17	6	23	5	0	23	12	6	24	0	0	90,000
91,000	21	19	10	22	7	5	22	15	0	23	2	7	23	10	2	23	17	9	24	5	4	91,000
92,000	22	4	8	22	12	4	23	0	0	23	7	8	23	15	4	24	3	0	24	10	8	92,000
93,000	22	9	6	22	17	3	23	5	0	23	12	9	24	0	6	24	8	3	24	16	0	93,000
94,000	22	14	4	23	2	2	23	10	0	23	17	10	24	5	8	24	13	6	25	1	4	94,000
95,000	22	19	2	23	7	1	23	15	0	24	2	11	24	10	10	24	18	9	25	6	8	95,000
96,000	23	4	0	23	12	0	24	0	0	24	8	0	24	16	0	25	4	0	25	12	0	96,000
97,000	23	8	10	23	16	11	24	5	0	24	13	1	25	1	2	25	9	3	25	17	4	97,000
98,000	23	13	8	24	1	10	24	10	0	24	18	2	25	6	4	25	14	6	26	2	8	98,000
99,000	23	18	6	24	6	9	24	15	0	25	3	3	25	11	6	25	19	9	26	8	0	99,000
100,000	24	3	4	24	11	8	25	0	0	25	8	4	25	16	8	26	5	0	26	13	4	100,000
200,000	48	6	8	49	3	4	50	0	0	50	16	8	51	13	4	52	10	0	53	6	8	200,000
300,000	72	10	0	73	15	0	75	0	0	76	5	0	77	10	0	87	15	0	80	0	0	300,000
400,000	96	13	4	98	6	8	100	0	0	101	13	4	103	6	8	105	0	0	106	13	4	400,000
500,000	120	16	8	122	18	4	125	0	0	127	1	8	129	3	4	131	5	0	133	6	8	500,000
600,000	145	0	0	147	10	0	150	0	0	152	10	0	155	0	0	157	10	0	160	0	0	600,000
700,000	169	3	4	172	1	8	175	0	0	177	18	4	180	16	8	183	15	0	186	13	4	700,000
800,000	193	6	8	196	13	4	200	0	0	203	6	8	206	13	4	210	0	0	213	6	8	800,000
900,000	217	10	0	221	5	0	225	0	0	228	15	0	232	10	0	236	5	0	240	0	0	900,000
1,000,000	241	13	4	245	16	8	250	0	0	254	3	4	258	6	8	262	10	0	266	13	4	1,000,000

TABLES

Showing the Value of Gas, from 100 *to* 1,000,000 *Cubic Feet, at Given Rates.*

VI.—From 5s. 5d. to 5s. 11d. per 1000 Cubic Feet.

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.							Cubic Feet of Gas Consumed.
	5s. 5d.	5s. 6d.	5s. 7d.	5s. 8d.	5s. 9d.	5s. 10d.	5s. 11d.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
100	. . 6½	. . 6½	. . 6½	. . 7	. . 7	. . 7	. . 7	100
200	. 1 1	. 1 1	. 1 1½	. 1 1½	. 1 2	. 1 2	. 1 2	200
300	. 1 7½	. 1 8	. 1 8	. 1 8½	. 1 8½	. 1 9	. 1 9½	300
400	. 2 2	. 2 2½	. 2 3	. 2 3	. 2 3½	. 2 4	. 2 4½	400
500	. 2 8½	. 2 9	. 2 9½	. 2 10	. 2 10½	. 2 11	. 2 11½	500
600	. 3 3	. 3 3½	. 3 4	. 3 5	. 3 5½	. 3 6	. 3 6½	600
700	. 3 9½	. 3 10	. 3 11	. 3 11½	. 4 0½	. 4 1	. 4 1½	700
800	. 4 4	. 4 5	. 4 5½	. 4 6½	. 4 7	. 4 8	. 4 9	800
900	. 4 10½	. 4 11½	. 5 0½	. 5 1	. 5 2	. 5 3	. 5 4	900
1,000	. 5 5	. 5 6	. 5 7	. 5 8	. 5 9	. 5 10	. 5 11	1,000
1,100	. 5 11½	. 6 0½	. 6 1½	. 6 3	. 6 4	. 6 5	. 6 6	1,100
1,200	. 6 6	. 6 7	. 6 8½	. 6 9½	. 6 11	. 7 0	. 7 1	1,200
1,300	. 7 0½	. 7 2	. 7 3	. 7 4½	. 7 5½	. 7 7	. 7 8½	1,300
1,400	. 7 7	. 7 8½	. 7 10	. 7 11	. 8 0½	. 8 2	. 8 3½	1,400
1,500	. 8 1½	. 8 3	. 8 4½	. 8 6	. 8 7½	. 8 9	. 8 10½	1,500
1,600	. 8 8	. 8 9½	. 8 11	. 9 1	. 9 2½	. 9 4	. 9 5½	1,600
1,700	. 9 2½	. 9 4	. 9 6	. 9 7½	. 9 9½	. 9 11	. 10 0½	1,700
1,800	. 9 9	. 9 11	. 10 0½	. 10 2½	. 10 4	. 10 6	. 10 8	1,800
1,900	. 10 3½	. 10 5½	. 10 7½	. 10 9	. 10 11	. 11 1	. 11 3	1,900
2,000	. 10 10	. 11 0	. 11 2	. 11 4	. 11 6	. 11 8	. 11 10	2,000
2,100	. 11 4½	. 11 6½	. 11 8½	. 11 11	. 12 1	. 12 3	. 12 5	2,100
2,200	. 11 11	. 12 1	. 12 3½	. 12 5½	. 12 8	. 12 10	. 13 0	2,200
2,300	. 12 5½	. 12 8	. 12 10	. 13 0½	. 13 2½	. 13 5	. 13 7½	2,300
2,400	. 13 0	. 13 2½	. 13 5	. 13 7	. 13 9½	. 14 0	. 14 2½	2,400
2,500	. 13 6½	. 13 9	. 13 11½	. 14 2	. 14 4½	. 14 7	. 14 9½	2,500
2,600	. 14 1	. 14 3½	. 14 6	. 14 9	. 14 11½	. 15 2	. 15 4½	2,600
2,700	. 14 7½	. 14 10	. 15 1	. 15 3½	. 15 6½	. 15 9	. 15 11½	2,700
2,800	. 15 2	. 15 5	. 15 7½	. 15 10½	. 16 1	. 16 4	. 16 7	2,800
2,900	. 15 8½	. 15 11½	. 16 2½	. 16 5	. 16 8	. 16 11	. 17 2	2,900
3,000	. 16 3	. 16 6	. 16 9	. 17 0	. 17 3	. 17 6	. 17 9	3,000
3,100	. 16 9½	. 17 0½	. 17 3½	. 17 7	. 17 10	. 18 1	. 18 4	3,100
3,200	. 17 4	. 17 7	. 17 10½	. 18 1½	. 18 5	. 18 8	. 18 11	3,200
3,300	. 17 10½	. 18 2	. 18 5	. 18 8½	. 18 11½	. 19 3	. 19 6½	3,300
3,400	. 18 5	. 18 8½	. 19 0	. 19 3	. 19 6½	. 19 10	1 0 1½	3,400
3,500	. 18 11½	. 19 3	. 19 6½	. 19 10	1 0 1½	1 0 5	1 0 8½	3,500
3,600	. 19 6	. 19 9½	1 0 1	1 0 5	1 0 8½	1 1 0	1 1 3½	3,600
3,700	1 0 0½	1 0 4	1 0 8	1 0 11½	1 1 3½	1 1 7	1 1 10½	3,700
3,800	1 0 7	1 0 11	1 1 2½	1 1 6½	1 1 10	1 2 2	1 2 6	3,800
3,900	1 1 1½	1 1 5½	1 1 9½	1 2 1	1 2 5	1 2 9	1 3 1	3,900
4,000	1 1 8	1 2 0	1 2 4	1 2 8	1 3 0	1 3 4	1 3 8	4,000
4,100	1 2 2½	1 2 6½	1 2 10½	1 3 3	1 3 7	1 3 11	1 4 3	4,100
4,200	1 2 9	1 3 1	1 3 5½	1 3 9½	1 4 2	1 4 6	1 4 10	4,200
4,300	1 3 3½	1 3 8	1 4 0	1 4 4½	1 4 8½	1 5 1	1 5 5½	4,300
4,400	1 3 10	1 4 2½	1 4 7	1 4 11	1 5 3½	1 5 8	1 6 0½	4,400
4,500	1 4 4½	1 4 9	1 5 1½	1 5 6	1 5 10½	1 6 3	1 6 7½	4,500
4,600	1 4 11	1 5 3½	1 5 8	1 6 1	1 6 5½	1 6 10	1 7 2½	4,600
4,700	1 5 5½	1 5 10	1 6 3	1 6 7½	1 7 0½	1 7 5	1 7 9½	4,700
4,800	1 6 0	1 6 5	1 6 9½	1 7 2½	1 7 7	1 8 0	1 8 5	4,800
4,900	1 6 6½	1 6 11½	1 7 4½	1 7 9	1 8 2	1 8 7	1 9 0	4,900
5,000	1 7 1	1 7 6	1 7 11	1 8 4	1 8 9	1 9 2	1 9 7	5,000
5,100	1 7 7½	1 8 0½	1 8 5½	1 8 11	1 9 4	1 9 9	1 10 2	5,100
5,200	1 8 2	1 8 7	1 9 0½	1 9 5½	1 9 11	1 10 4	1 10 9	5,200
5,300	1 8 8½	1 9 2	1 9 7	1 10 0½	1 10 5½	1 10 11	1 11 4½	5,300
5,400	1 9 3	1 9 8½	1 10 2	1 10 7	1 11 0½	1 11 6	1 11 11½	5,400
5,500	1 9 9½	1 10 3	1 10 8½	1 11 2	1 11 7½	1 12 1	1 12 6½	5,500
5,600	1 10 4	1 10 9½	1 11 3	1 11 9	1 12 2½	1 12 8	1 13 1½	5,600
5,700	1 10 10½	1 11 4	1 11 10	1 12 3½	1 12 9½	1 13 3	1 13 8½	5,700
5,800	1 11 5	1 11 11	1 12 4½	1 12 10½	1 13 4	1 13 10	1 14 4	5,800
5,900	1 11 11½	1 12 5½	1 12 11½	1 13 5	1 13 11	1 14 5	1 14 11	5,900
6,000	1 12 6	1 13 0	1 13 6	1 14 0	1 14 6	1 15 0	1 15 6	6,000
6,100	1 13 0½	1 13 6½	1 14 0½	1 14 7	1 15 1	1 15 7	1 16 1	6,100
6,200	1 13 7	1 14 1	1 14 7½	1 15 1½	1 15 8	1 16 2	1 16 8	6,200
6,300	1 14 1½	1 14 8	1 15 2	1 15 8½	1 16 2½	1 16 9	1 17 3½	6,300

VI.—From 5*s.* 5*d.* to 5*s.* 11*d.* per 1000 Cubic Feet—(*continued.*)

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.							Cubic Feet of Gas Consumed.
	5s. 5d.	5s. 6d.	5s. 7d.	5s. 8d.	5s. 9d.	5s. 10d.	5s. 11d.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
6,400	1 14 8	1 15 2½	1 15 9	1 16 3	1 16 9½	1 17 4	1 17 10½	6,400
6,500	1 15 2½	1 15 9	1 16 3½	1 16 10	1 17 4½	1 17 11	1 18 5½	6,500
6,600	1 15 9	1 16 3½	1 16 10	1 17 5	1 17 11½	1 18 6	1 19 0½	6,600
6,700	1 16 3½	1 16 10	1 17 5	1 17 11½	1 18 6½	1 19 1	1 19 7½	6,700
6,800	1 16 10	1 17 5	1 17 11½	1 18 6½	1 19 1	1 19 8	2 0 3	6,800
6,900	1 17 4½	1 17 11½	1 18 6½	1 19 1	1 19 8	2 0 3	2 0 10	6,900
7,000	1 17 11	1 18 6	1 19 1	1 19 8	2 0 3	2 0 10	2 1 5	7,000
7,100	1 18 5½	1 19 0½	1 19 7½	2 0 3	2 0 10	2 1 5	2 2 0	7,100
7,200	1 19 0	1 19 7	2 0 2½	2 0 9½	2 1 5	2 2 0	2 2 7	7,200
7,300	1 19 6½	2 0 2	2 0 9	2 1 4½	2 1 11½	2 2 7	2 3 2½	7,300
7,400	2 0 1	2 0 8½	2 1 4	2 1 11	2 2 6½	2 3 2	2 3 9½	7,400
7,500	2 0 7½	2 1 3	2 1 10½	2 2 6	2 3 1½	2 3 9	2 4 4½	7,500
7,600	2 1 2	2 1 9½	2 2 5	2 3 1	2 3 8½	2 4 4	2 4 11½	7,600
7,700	2 1 8½	2 2 4	2 3 0	2 3 7½	2 4 3½	2 4 11	2 5 6½	7,700
7,800	2 2 3	2 2 11	2 3 6½	2 4 2½	2 4 10	2 5 6	2 6 2	7,800
7,900	2 2 9½	2 3 5½	2 4 1½	2 4 9	2 5 5	2 6 1	2 6 9	7,900
8,000	2 3 4	2 4 0	2 4 8	2 5 4	2 6 0	2 6 8	2 7 4	8,000
8,100	2 3 10½	2 4 6½	2 5 2½	2 5 11	2 6 7	2 7 3	2 7 11	8,100
8,200	2 4 5	2 5 1	2 5 9½	2 6 5½	2 7 2	2 7 10	2 8 6	8,200
8,300	2 4 11½	2 5 8	2 6 4	2 7 0½	2 7 8½	2 8 5	2 9 1½	8,300
8,400	2 5 6	2 6 2½	2 6 11	2 7 7	2 8 3½	2 9 0	2 9 8½	8,400
8,500	2 6 0½	2 6 9	2 7 5½	2 8 2	2 8 10½	2 9 7	2 10 3½	8,500
8,600	2 6 7	2 7 3½	2 8 0	2 8 9	2 9 5½	2 10 2	2 10 10½	8,600
8,700	2 7 1½	2 7 10	2 8 7	2 9 3½	2 10 0½	2 10 9	2 11 5½	8,700
8,800	2 7 8	2 8 5	2 9 1½	2 9 10½	2 10 7	2 11 4	2 12 1	8,800
8,900	2 8 2½	2 8 11½	2 9 8½	2 10 5	2 11 2	2 11 11	2 12 8	8,900
9,000	2 8 9	2 9 6	2 10 3	2 11 0	2 11 9	2 12 6	2 13 3	9,000
9,100	2 9 3½	2 10 0½	2 10 9½	2 11 7	2 12 4	2 13 1	2 13 10	9,100
9,200	2 9 10	2 10 7	2 11 4½	2 12 1½	2 12 11	2 13 8	2 14 5	9,200
9,300	2 10 4½	2 11 2	2 11 11	2 12 8½	2 13 5½	2 14 3	2 15 0½	9,300
9,400	2 10 11	2 11 8½	2 12 6	2 13 3	2 14 0½	2 14 10	2 15 7½	9,400
9,500	2 11 5½	2 12 3	2 13 0½	2 13 10	2 14 7½	2 15 5	2 16 2½	9,500
9,600	2 12 0	2 12 9½	2 13 7	2 14 5	2 15 2½	2 16 0	2 16 9½	9,600
9,700	2 12 6½	2 13 4	2 14 2	2 14 11½	2 15 9½	2 16 7	2 17 4½	9,700
9,800	2 13 1	2 13 11	2 14 8½	2 15 6½	2 16 4	2 17 2	2 18 0	9,800
9,900	2 13 7½	2 14 5½	2 15 3½	2 16 1	2 16 11	2 17 9	2 18 7	9,900
10,000	2 14 2	2 15 0	2 15 10	2 16 8	2 17 6	2 18 4	2 19 2	10,000
11,000	2 19 7	3 0 6	3 1 5	3 2 4	3 3 3	3 4 2	3 5 1	11,000
12,000	3 5 0	3 6 0	3 7 0	3 8 0	3 9 0	3 10 0	3 11 0	12,000
13,000	3 10 5	3 11 6	3 12 7	3 13 8	3 14 9	3 15 10	3 16 11	13,000
14,000	3 15 10	3 17 0	3 18 2	3 19 4	4 0 6	4 1 8	4 2 10	14,000
15,000	4 1 3	4 2 6	4 3 9	4 5 0	4 6 3	4 7 6	4 8 9	15,000
16,000	4 6 8	4 8 0	4 9 4	4 10 8	4 12 0	4 13 4	4 14 8	16,000
17,000	4 12 1	4 13 6	4 14 11	4 16 4	4 17 9	4 19 2	5 0 7	17,000
18,000	4 17 6	4 19 0	5 0 6	5 2 0	5 3 6	5 5 0	5 6 6	18,000
19,000	5 2 11	5 4 6	5 6 1	5 7 8	5 9 3	5 10 10	5 12 5	19,000
20,000	5 8 4	5 10 0	5 11 8	5 13 4	5 15 0	5 16 8	5 18 4	20,000
21,000	5 13 9	5 15 6	5 17 3	5 19 0	6 0 9	6 2 6	6 4 3	21,000
22,000	5 19 2	6 1 0	6 2 10	6 4 8	6 6 6	6 8 4	6 10 2	22,000
23,000	6 4 7	6 6 6	6 8 5	6 10 4	6 12 3	6 14 2	6 16 1	23,000
24,000	6 10 0	6 12 0	6 14 0	6 16 0	6 18 0	7 0 0	7 2 0	24,000
25,000	6 15 5	6 17 6	6 19 7	7 1 8	7 3 9	7 5 10	7 7 11	25,000
26,000	7 0 10	7 3 0	7 5 2	7 7 4	7 9 6	7 11 8	7 13 10	26,000
27,000	7 6 3	7 8 6	7 10 9	7 13 0	7 15 3	7 17 6	7 19 9	27,000
28,000	7 11 8	7 14 0	7 16 4	7 18 8	8 1 0	8 3 4	8 5 8	28,000
29,000	7 17 1	7 19 6	8 1 11	8 4 4	8 6 9	8 9 2	8 11 7	29,000
30,000	8 2 6	8 5 0	8 7 6	8 10 0	8 12 6	8 15 0	8 17 6	30,000
31,000	8 7 11	8 10 6	8 13 1	8 15 8	8 18 3	9 0 10	9 3 5	31,000
32,000	8 13 4	8 16 0	8 18 8	9 1 4	9 4 0	9 6 8	9 9 4	32,000
33,000	8 18 9	9 1 6	9 4 3	9 7 0	9 9 9	9 12 6	9 15 3	33,000
34,000	9 4 2	9 7 0	9 9 10	9 12 8	9 15 6	9 18 4	10 1 2	34,000
35,000	9 9 7	9 12 6	9 15 5	9 18 4	10 1 3	10 4 2	10 7 1	35,000
36,000	9 15 0	9 18 0	10 1 0	10 4 0	10 7 0	10 10 0	10 13 0	36,000
37,000	10 0 5	10 3 6	10 6 7	10 9 8	10 12 9	10 15 10	10 18 11	37,000
38,000	10 5 10	10 9 0	10 12 2	10 15 4	10 18 6	11 1 8	11 4 10	38,000
39,000	10 11 3	10 14 6	10 17 9	11 1 0	11 4 3	11 7 6	11 10 9	39,000
40,000	10 16 8	11 0 0	11 3 4	11 6 8	11 10 0	11 13 4	11 16 8	40,000
41,000	11 2 1	11 5 6	11 8 11	11 12 4	11 15 9	11 19 2	12 2 7	41,000

VI.—From *5s. 5d.* to *5s.* 11*d.* per 1000 Cubic Feet—(*continued.*)

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.																								Cubic Feet of Gas Consumed.
	5s. 5d.			5s. 6d.			5s. 7d.			5s. 8d.			5s. 9d.			5s. 10d.			5s. 11d.						
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.				
42,000	11	7	6	11	11	0	11	14	6	11	18	0	12	1	6	12	5	0	12	8	6				42,000
43,000	11	12	11	11	16	6	12	0	1	12	3	8	12	7	3	12	10	10	12	14	5				43,000
44,000	11	18	4	12	2	0	12	5	8	12	9	4	12	13	0	12	16	8	13	0	4				44,000
45,000	12	3	9	12	7	6	12	11	3	12	15	0	12	18	9	13	2	6	13	6	3				45,000
46,000	12	9	2	12	13	0	12	16	10	13	0	8	13	4	6	13	8	4	13	12	2				46,000
47,000	12	14	7	12	18	6	13	2	5	13	6	4	13	10	3	13	14	2	13	18	1				47,000
48,000	13	0	0	13	4	0	13	8	0	13	12	0	13	16	0	14	0	0	14	4	0				48,000
49,000	13	5	5	13	9	6	13	13	7	13	17	8	14	1	9	14	5	10	14	9	11				49,000
50,000	13	10	10	13	15	0	13	19	2	14	3	4	14	7	6	14	11	8	14	15	10				50,000
51,000	13	16	3	14	0	6	14	4	9	14	9	0	14	13	3	14	17	6	15	1	9				51,000
52,000	14	1	8	14	6	0	14	10	4	14	14	8	14	19	0	15	3	4	15	7	8				52,000
53,000	14	7	1	14	11	6	14	15	11	15	0	4	15	4	9	15	9	2	15	13	7				53,000
54,000	14	12	6	14	17	0	15	1	6	15	6	0	15	10	6	15	15	0	15	19	6				54,000
55,000	14	17	11	15	2	6	15	7	1	15	11	8	15	16	3	16	0	10	16	5	5				55,000
56,000	15	3	4	15	8	0	15	12	8	15	17	4	16	2	0	16	6	8	16	11	4				56,000
57,000	15	8	9	15	13	6	15	18	3	16	3	0	16	7	9	16	12	6	16	17	3				57,000
58,000	15	14	2	15	19	0	16	3	10	16	8	8	16	13	6	16	18	4	17	3	2				58,000
59,000	15	19	7	16	4	6	16	9	5	16	14	4	16	19	3	17	4	2	17	9	1				59,000
60,000	16	5	0	16	10	0	16	15	0	17	0	0	17	5	0	17	10	0	17	15	0				60,000
61,000	16	10	5	16	15	6	17	0	7	17	5	8	17	10	9	17	15	10	18	0	11				61,000
62,000	16	15	10	17	1	0	17	6	2	17	11	4	17	16	6	18	1	8	18	6	10				62,000
63,000	17	1	3	17	6	6	17	11	9	17	17	0	18	2	3	18	7	6	18	12	9				63,000
64,000	17	6	8	17	12	0	17	17	4	18	2	8	18	8	0	18	13	4	18	18	8				64,000
65,000	17	12	1	17	17	6	18	2	11	18	8	4	18	13	9	18	19	2	19	4	7				65,000
66,000	17	17	6	18	3	0	18	8	6	18	14	0	18	19	6	19	5	0	19	10	6				66,000
67,000	18	2	11	18	8	6	18	14	1	18	19	8	19	5	3	19	10	10	19	16	5				67,000
68,000	18	8	4	18	14	0	18	19	8	19	5	4	19	11	0	19	16	8	20	2	4				68,000
69,000	18	13	9	18	19	6	19	5	3	19	11	0	19	16	9	20	2	6	20	8	3				69,000
70,000	18	19	2	19	5	0	19	10	10	19	16	8	20	2	6	20	8	4	20	14	2				70,000
71,000	19	4	7	19	10	6	19	16	5	20	2	4	20	8	3	20	14	2	21	0	1				71,000
72,000	19	10	0	19	16	0	20	2	0	20	8	0	20	14	0	21	0	0	21	6	0				72,000
73,000	19	15	5	20	1	6	20	7	7	20	13	8	20	19	9	21	5	10	21	11	11				73,000
74,000	20	0	10	20	7	0	20	13	2	20	19	4	21	5	6	21	11	8	21	17	10				74,000
75,000	20	6	3	20	12	6	20	18	9	21	5	0	21	11	3	21	17	6	22	3	9				75,000
76,000	20	11	8	20	18	0	21	4	4	21	10	8	21	17	0	22	3	4	22	9	8				76,000
77,000	20	17	1	21	3	6	21	9	11	21	16	4	22	2	9	22	9	2	22	15	7				77,000
78,000	21	2	6	21	9	0	21	15	6	22	2	0	22	8	6	22	15	0	23	1	6				78,000
79,000	21	7	11	21	14	6	22	1	1	22	7	8	22	14	3	23	0	10	23	7	5				79,000
80,000	21	13	4	22	0	0	22	6	8	22	13	4	23	0	0	23	6	8	23	13	4				80,000
81,000	21	18	9	22	5	6	22	12	3	22	19	0	23	5	9	23	12	6	23	19	3				81,000
82,000	22	4	2	22	11	0	22	17	10	23	4	8	23	11	6	23	18	4	24	5	2				82,000
83,000	22	9	7	22	16	6	23	3	5	23	10	4	23	17	3	24	4	2	24	11	1				83,000
84,000	22	15	0	23	2	0	23	9	0	23	16	0	24	3	0	24	10	0	24	17	0				84,000
85,000	23	0	5	23	7	6	23	14	7	24	1	8	24	8	9	24	15	10	25	2	11				85,000
86,000	23	5	10	23	13	0	24	0	2	24	7	4	24	14	6	25	1	8	25	8	10				86,000
87,000	23	11	3	23	18	6	24	5	9	24	13	0	25	0	3	25	7	6	25	14	9				87,000
88,000	23	16	8	24	4	0	24	11	4	24	18	8	25	6	0	25	13	4	26	0	8				88,000
89,000	24	2	1	24	9	6	24	16	11	25	4	4	25	11	9	25	19	2	26	6	7				89,000
90,000	24	7	6	24	15	0	25	2	6	25	10	0	25	17	6	26	5	0	26	12	6				90,000
91,000	24	12	11	25	0	6	25	8	1	25	15	8	26	3	3	26	10	10	26	18	5				91,000
92,000	24	18	4	25	6	0	25	13	8	26	1	4	26	9	0	26	16	8	27	4	4				92,000
93,000	25	3	9	25	11	6	25	19	3	26	7	0	26	14	9	27	2	6	27	10	3				93,000
94,000	25	9	2	25	17	0	26	4	10	26	12	8	27	0	6	27	8	4	27	16	2				94,000
95,000	25	14	7	26	2	6	26	10	5	26	18	4	27	6	3	27	14	2	28	2	1				95,000
96,000	26	0	0	26	8	0	26	16	0	27	4	0	27	12	0	28	0	0	28	8	0				96,000
97,000	26	5	5	26	13	6	27	1	7	27	9	8	27	17	9	28	5	10	28	13	11				97,000
98,000	26	10	10	26	19	0	27	7	2	27	15	4	28	3	6	28	11	8	28	19	10				98,000
99,000	26	16	3	27	4	6	27	12	9	28	1	0	28	9	3	28	17	6	29	5	9				99,000
100,000	27	1	8	27	10	0	27	18	4	28	6	8	28	15	0	29	3	4	29	11	8				100,000
200,000	54	3	4	55	0	0	55	16	8	56	13	4	57	10	0	58	6	8	59	3	4				200,000
300,000	81	5	0	82	10	0	83	15	0	85	0	0	86	5	0	87	10	0	88	15	0				300,000
400,000	108	6	8	110	0	0	111	13	4	113	6	8	115	0	0	116	13	4	118	6	8				400,000
500,000	135	8	4	137	10	0	139	11	8	141	13	4	143	15	0	145	16	8	147	18	4				500,000
600,000	162	10	0	165	0	0	167	10	0	170	0	0	172	10	0	175	0	0	177	10	0				600,000
700,000	189	11	8	192	10	0	195	8	4	198	6	8	201	5	0	204	3	4	207	1	8				700,000
800,000	216	13	4	220	0	0	223	6	8	226	13	4	230	0	0	233	6	8	236	13	4				800,000
900,000	243	15	0	247	10	0	251	5	0	255	0	0	258	15	0	262	10	0	266	5	0				900,000
1,000,000	270	16	8	275	0	0	279	3	4	283	6	8	287	10	0	291	13	4	295	16	8				1,000,000

TABLES

Showing the Value of Gas, from 100 *to* 1,000,000 *Cubic Feet, at Given Rates.*

VII.—From 6*s.* to 6*s.* 6*d.* per 1000 Cubic Feet.

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.																					Cubic Feet of Gas Consumed.
	6s. 0d.			6s. 1d.			6s. 2d.			6s. 3d.			6s. 4d.			6s. 5d.			6s. 6d.			
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
100	.	.	7	.	.	7½	.	.	7½	.	.	7½	.	.	7½	.	.	7½	.	.	8	100
200	.	1	2½	.	1	2½	.	1	3	.	1	3	.	1	3	.	1	3½	.	1	3½	200
300	.	1	9½	.	1	10	.	1	10	.	1	10½	.	1	11	.	1	11	.	1	11½	300
400	.	2	5	.	2	5	.	2	5½	.	2	6	.	2	6½	.	2	7	.	2	7	400
500	.	3	0	.	3	0½	.	3	1	.	3	1½	.	3	2	.	3	2½	.	3	3	500
600	.	3	7	.	3	8	.	3	8½	.	3	9	.	3	9½	.	3	10	.	3	11	600
700	.	4	2½	.	4	3	.	4	4	.	4	4½	.	4	5	.	4	6	.	4	6½	700
800	.	4	9½	.	4	10½	.	4	11	.	5	0	.	5	1	.	5	1½	.	5	2½	800
900	.	5	5	.	5	5½	.	5	6½	.	5	7½	.	5	8½	.	5	9½	.	5	10	900
1,000	.	6	0	.	6	1	.	6	2	.	6	3	.	6	4	.	6	5	.	6	6	1,000
1,100	.	6	7	.	6	8½	.	6	9½	.	6	10½	.	6	11½	.	7	0½	.	7	2	1,100
1,200	.	7	2½	.	7	3½	.	7	5	.	7	6	.	7	7	.	7	8½	.	7	9½	1,200
1,300	.	7	9½	.	7	11	.	8	0	.	8	1½	.	8	3	.	8	4	.	8	5½	1,300
1,400	.	8	5	.	8	6	.	8	7½	.	8	9	.	8	10½	.	9	0	.	9	1	1,400
1,500	.	9	0	.	9	1½	.	9	3	.	9	4½	.	9	6	.	9	7½	.	9	9	1,500
1,600	.	9	7	.	9	9	.	9	10½	.	10	0	.	10	1½	.	10	3	.	10	5	1,600
1,700	.	10	2½	.	10	4	.	10	6	.	10	7½	.	10	9	.	10	11	.	11	0½	1,700
1,800	.	10	9½	.	10	11½	.	11	1	.	11	3	.	11	5	.	11	6½	.	11	8½	1,800
1,900	.	11	5	.	11	6½	.	11	8½	.	11	10½	.	12	0½	.	12	2½	.	12	4	1,900
2,000	.	12	0	.	12	2	.	12	4	.	12	6	.	12	8	.	12	10	.	13	0	2,000
2,100	.	12	7	.	12	9½	.	12	11½	.	13	1½	.	13	3½	.	13	5½	.	13	8	2,100
2,200	.	13	2½	.	13	4½	.	13	7	.	13	9	.	13	11	.	14	1½	.	14	3½	2,200
2,300	.	13	9½	.	14	0	.	14	2	.	14	4½	.	14	7	.	14	9	.	14	11½	2,300
2,400	.	14	5	.	14	7	.	14	9½	.	15	0	.	15	2½	.	15	5	.	15	7	2,400
2,500	.	15	0	.	15	2½	.	15	5	.	15	7½	.	15	10	.	16	0½	.	16	3	2,500
2,600	.	15	7	.	15	10	.	16	0½	.	16	3	.	16	5½	.	16	8	.	16	11	2,600
2,700	.	16	2½	.	16	5	.	16	8	.	16	10½	.	17	1	.	17	4		17	6½	2,700
2,800	.	16	9½	.	17	0½	.	17	3	.	17	6	.	17	9	.	17	11½	.	18	2½	2,800
2,900	.	17	5	.	17	7½	.	17	10½	.	18	1½	.	18	4½	.	18	7½	.	18	10	2,900
3,000	.	18	0	.	18	3	.	18	6	.	18	9	.	19	0	.	19	3	.	19	6	3,000
3,100	.	18	7	.	18	10½	.	19	1½	.	19	4½	.	19	7½	.	19	10½	1	0	2	3,100
3,200	.	19	2½	.	19	5½	.	19	9	1	0	0	1	0	3	1	0	6½	1	0	9½	3,200
3,300	.	19	9½	1	0	1	1	0	4	1	0	7½	1	0	11	1	1	2	1	1	5½	3,300
3,400	1	0	5	1	0	8	1	0	11½	1	1	3	1	1	6½	1	1	10	1	2	1	3,400
3,500	1	1	0	1	1	3½	1	1	7	1	1	10½	1	2	2	1	2	5½	1	2	9	3,500
3,600	1	1	7	1	1	11	1	2	2½	1	2	6	1	2	9½	1	3	1	1	3	5	3,600
3,700	1	2	2½	1	2	6	1	2	10	1	3	1½	1	3	5	1	3	9	1	4	0½	3,700
3,800	1	2	9½	1	3	1½	1	3	5	1	3	9	1	4	1	1	4	4½	1	4	8½	3,800
3,900	1	3	5	1	3	8½	1	4	0½	1	4	4½	1	4	8½	1	5	0½	1	5	4	3,900
4,000	1	4	0	1	4	4	1	4	8	1	5	0	1	5	4	1	5	8	1	6	0	4,000
4,100	1	4	7	1	4	11½	1	5	3½	1	5	7½	1	5	11½	1	6	3½	1	6	8	4,100
4,200	1	5	2½	1	5	6½	1	5	11	1	6	3	1	6	7	1	6	11½	1	7	3½	4,200
4,300	1	5	9½	1	6	2	1	6	6	1	6	10½	1	7	3	1	7	7	1	7	11½	4,300
4,400	1	6	5	1	6	9	1	7	1½	1	7	6	1	7	10½	1	8	3	1	8	7	4,400
4,500	1	7	0	1	7	4½	1	7	9	1	8	1½	1	8	6	1	8	10½	1	9	3	4,500
4,600	1	7	7	1	8	0	1	8	4½	1	8	9	1	9	1½	1	9	6	1	9	11	4,600
4,700	1	8	2½	1	8	7	1	9	0	1	9	4½	1	9	9	1	10	2	1	10	6½	4,700
4,800	1	8	9½	1	9	2½	1	9	7	1	10	0	1	10	5	1	10	9½	1	11	2½	4,800
4,900	1	9	5	1	9	9½	1	10	2½	1	10	7½	1	11	0½	1	11	5½	1	11	10	4,900
5,000	1	10	0	1	10	5	1	10	10	1	11	3	1	11	8	1	12	1	1	12	6	5,000
5,100	1	10	7	1	11	0½	1	11	5½	1	11	10½	1	12	3½	1	12	8½	1	13	2	5,100
5,200	1	11	2½	1	11	7½	1	12	1	1	12	6	1	12	11	1	13	4½	1	13	9½	5,200
5,300	1	11	9½	1	12	3	1	12	8	1	13	1½	1	13	7	1	14	0	1	14	5½	5,300
5,400	1	12	5	1	12	10	1	13	3½	1	13	9	1	14	2½	1	14	8	1	15	1	5,400
5,500	1	13	0	1	13	5½	1	13	11	1	14	4½	1	14	10	1	15	3½	1	15	9	5,500
5,600	1	13	7	1	14	1	1	14	6½	1	15	0	1	15	5½	1	15	11	1	16	5	5,600
5,700	1	14	2½	1	14	8	1	15	2	1	15	7½	1	16	1	1	16	7	1	17	0½	5,700
5,800	1	14	9½	1	15	3½	1	15	9	1	16	3	1	16	9	1	17	2½	1	17	8½	5,800
5,900	1	15	5	1	15	10½	1	16	4½	1	16	10½	1	17	4½	1	17	10½	1	18	4	5,900
6,000	1	16	0	1	16	6	1	17	0	1	17	6	1	18	0	1	18	6	1	19	0	6,000
6,100	1	16	7	1	17	1½	1	17	7½	1	18	1½	1	18	7½	1	19	1½	1	19	8	6,100
6,200	1	17	2½	1	17	8½	1	18	3	1	18	9	1	19	3	1	19	9½	2	0	3½	6,200
6,300	1	17	9½	1	18	4	1	18	10	1	19	4½	1	19	11	2	0	5	2	0	11½	6,300

VII.—From 6*s.* to 6*s.* 6*d.* per 1000 Cubic Feet—(*continued.*)

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.							Cubic Feet of Gas Consumed.
	6s. 0d.	6s. 1d.	6s. 2d.	6s. 3d.	6s. 4d.	6s. 5d.	6s. 6d.	
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
6,400	1 18 6	1 18 11	1 19 5½	2 0 0	2 0 6½	2 1 1	2 1 7	6,400
6,500	1 19 0	1 19 6½	2 0 1	2 0 7½	2 1 2	2 1 8½	2 2 3	6,500
6,600	1 19 7	2 0 2	2 0 8½	2 1 3	2 1 9½	2 2 4	2 2 11	6,600
6,700	2 0 2½	2 0 9	2 1 4	2 1 10½	2 2 5	2 3 0	2 3 6½	6,700
6,800	2 0 9½	2 1 4½	2 1 11	2 2 6	2 3 1	2 3 7½	2 4 2½	6,800
6,900	2 1 5	2 1 11½	2 2 6½	2 3 1½	2 3 8½	2 4 3½	2 4 10	6,900
7,000	2 2 0	2 2 7	2 3 2	2 3 9	2 4 4	2 4 11	2 5 6	7,000
7,100	2 2 7	2 3 2½	2 3 9½	2 4 4½	2 4 11½	2 5 6½	2 6 2	7,100
7,200	2 3 2½	2 3 9½	2 4 5	2 5 0	2 5 7	2 6 2½	2 6 9½	7,200
7,300	2 3 9½	2 4 5	2 5 0	2 5 7½	2 6 3	2 6 10	2 7 5½	7,300
7,400	2 4 5	2 5 0	2 5 7½	2 6 3	2 6 10½	2 7 6	2 8 1	7,400
7,500	2 5 0	2 5 7½	2 6 3	2 6 10½	2 7 6	2 8 1½	2 8 9	7,500
7,600	2 5 7	2 6 3	2 6 10½	2 7 6	2 8 1½	2 8 9	2 9 5	7,600
7,700	2 6 2½	2 6 10	2 7 6	2 8 1½	2 8 9	2 9 5	2 10 0½	7,700
7,800	2 6 9½	2 7 5½	2 8 1	2 8 9	2 9 5	2 10 0½	2 10 8½	7,800
7,900	2 7 5	2 8 0½	2 8 8½	2 9 4½	2 10 0½	2 10 8½	2 11 4	7,900
8,000	2 8 0	2 8 8	2 9 4	2 10 0	2 10 8	2 11 4	2 12 0	8,000
8,100	2 8 7	2 9 3½	2 9 11½	2 10 7½	2 11 3½	2 11 11½	2 12 8	8,100
8,200	2 9 2½	2 9 10½	2 10 7	2 11 3	2 11 11	2 12 7½	2 13 3½	8,200
8,300	2 9 9½	2 10 6	2 11 2	2 11 10½	2 12 7	2 13 3	2 13 11½	8,300
8,400	2 10 5	2 11 1	2 11 9½	2 12 6	2 13 2½	2 13 11	2 14 7	8,400
8,500	2 11 0	2 11 8½	2 12 5	2 13 1½	2 13 10	2 14 6½	2 15 3	8,500
8,600	2 11 7	2 12 4	2 13 0½	2 13 9	2 14 5½	2 15 2	2 15 11	8,600
8,700	2 12 2½	2 12 11	2 13 8	2 14 4½	2 15 1	2 15 10	2 16 6½	8,700
8,800	2 12 9½	2 13 6½	2 14 3	2 15 0	2 15 9	2 16 5½	2 17 2½	8,800
8,900	2 13 5	2 14 1½	2 14 10½	2 15 7½	2 16 4½	2 17 1½	2 17 10	8,900
9,000	2 14 0	2 14 9	2 15 6	2 16 3	2 17 0	2 17 9	2 18 6	9,000
9,100	2 14 7	2 15 4½	2 16 1½	2 16 10½	2 17 7½	2 18 4½	2 19 2	9,100
9,200	2 15 2½	2 15 11½	2 16 9	2 17 6	2 18 3	2 19 0½	2 19 9½	9,200
9,300	2 15 9½	2 16 7	2 17 4	2 18 1½	2 18 11	2 19 8	3 0 5½	9,300
9,400	2 16 5	2 17 2	2 17 11½	2 18 9	2 19 6½	3 0 4	3 1 1	9,400
9,500	2 17 0	2 17 9½	2 18 7	2 19 4½	3 0 2	3 0 11½	3 1 9	9,500
9,600	2 17 7	2 18 5	2 19 2½	3 0 0	3 0 9½	3 1 7	3 2 5	9,600
9,700	2 18 2½	2 19 0	2 19 10	3 0 7½	3 1 5	3 2 3	3 3 0½	9,700
9,800	2 18 9½	2 19 7½	3 0 5	3 1 3	3 2 1	3 2 10½	3 3 8½	9,800
9,900	2 19 5	3 0 2½	3 1 0½	3 1 10½	3 2 8½	3 3 6½	3 4 4	9,900
10,000	3 0 0	3 0 10	3 1 8	3 2 6	3 3 4	3 4 2	3 5 0	10,000
11,000	3 6 0	3 6 11	3 7 10	3 8 9	3 9 8	3 10 7	3 11 6	11,000
12,000	3 12 0	3 13 0	3 14 0	3 15 0	3 16 0	3 17 0	3 18 0	12,000
13,000	3 18 0	3 19 1	4 0 2	4 1 3	4 2 4	4 3 5	4 4 6	13,000
14,000	4 4 0	4 5 2	4 6 4	4 7 6	4 8 8	4 9 10	4 11 0	14,000
15,000	4 10 0	4 11 3	4 12 6	4 13 9	4 15 0	4 16 3	4 17 6	15,000
16,000	4 16 0	4 17 4	4 18 8	5 0 0	5 1 4	5 2 8	5 4 0	16,000
17,000	5 2 0	5 3 5	5 4 10	5 6 3	5 7 8	5 9 1	5 10 6	17,000
18,000	5 8 0	5 9 6	5 11 0	5 12 6	5 14 0	5 15 6	5 17 0	18,000
19,000	5 14 0	5 15 7	5 17 2	5 18 9	6 0 4	6 1 11	6 3 6	19,000
20,000	6 0 0	6 1 8	6 3 4	6 5 0	6 6 8	6 8 4	6 10 0	20,000
21,000	6 6 0	6 7 9	6 9 6	6 11 3	6 13 0	6 14 9	6 16 6	21,000
22,000	6 12 0	6 13 10	6 15 8	6 17 6	6 19 4	7 1 2	7 3 0	22,000
23,000	6 18 0	6 19 11	7 1 10	7 3 9	7 5 8	7 7 7	7 9 6	23,000
24,000	7 4 0	7 6 0	7 8 0	7 10 0	7 12 0	7 14 0	7 16 0	24,000
25,000	7 10 0	7 12 1	7 14 2	7 16 3	7 18 4	8 0 5	8 2 6	25,000
26,000	7 16 0	7 18 2	8 0 4	8 2 6	8 4 8	8 6 10	8 9 0	26,000
27,000	8 2 0	8 4 3	8 6 6	8 8 9	8 11 0	8 13 3	8 15 6	27,000
28,000	8 8 0	8 10 4	8 12 8	8 15 0	8 17 4	8 19 8	9 2 0	28,000
29,000	8 14 0	8 16 5	8 18 10	9 1 3	9 3 8	9 6 1	9 8 6	29,000
30,000	9 0 0	9 2 6	9 5 0	9 7 6	9 10 0	9 12 6	9 15 0	30,000
31,000	9 6 0	9 8 7	9 11 2	9 13 9	9 16 4	9 18 11	10 1 6	31,000
32,000	9 12 0	9 14 8	9 17 4	10 0 0	10 2 8	10 5 4	10 8 0	32,000
33,000	9 18 0	10 0 9	10 3 6	10 6 3	10 9 0	10 11 9	10 14 6	33,000
34,000	10 4 0	10 6 10	10 9 8	10 12 6	10 15 4	10 18 2	11 1 0	34,000
35,000	10 10 0	10 12 11	10 15 10	10 18 9	11 1 8	11 4 7	11 7 6	35,000
36,000	10 16 0	10 19 0	11 2 0	11 5 0	11 8 0	11 11 0	11 14 0	36,000
37,000	11 2 0	11 5 1	11 8 2	11 11 3	11 14 4	11 17 5	12 0 6	37,000
38,000	11 8 0	11 11 2	11 14 4	11 17 6	12 0 8	12 3 10	12 7 0	38,000
39,000	11 14 0	11 17 3	12 0 6	12 3 9	12 7 0	12 10 3	12 13 6	39,000
40,000	12 0 0	12 3 4	12 6 8	12 10 0	12 13 4	12 16 8	13 0 0	40,000
41,000	12 6 0	12 9 5	12 12 10	12 16 3	12 19 8	13 3 1	13 6 6	41,000

VII.—From 6*s.* to 6*s.* 6*d.* per 1000 Cubic Feet—(*continued.*)

Cubic Feet of Gas Consumed.	Selling Price of Gas per 1000 Cubic Feet.																					Cubic Feet of Gas Consumed.
	6s. 0d.			6s. 1d.			6s. 2d.			6s. 3d.			6s. 4d.			6s. 5d.			6s. 6d.			
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
42,000	12	12	0	12	15	6	12	19	0	13	2	6	13	6	0	13	9	6	13	13	0	42,000
43,000	12	18	0	13	1	7	13	5	2	13	8	9	13	12	4	13	15	11	13	19	6	43,000
44,000	13	4	0	13	7	8	13	11	4	13	15	0	13	18	8	14	2	4	14	6	0	44,000
45,000	13	10	0	13	13	9	13	17	6	14	1	3	14	5	0	14	8	9	14	12	6	45,000
46,000	13	16	0	13	19	10	14	3	8	14	7	6	14	11	4	14	15	2	14	19	0	46,000
47,000	14	2	0	14	5	11	14	9	10	14	13	9	14	17	8	15	1	7	15	5	6	47,000
48,000	14	8	0	14	12	0	14	16	0	15	0	0	15	4	0	15	8	0	15	12	0	48,000
49,000	14	14	0	14	18	1	15	2	2	15	6	3	15	10	4	15	14	5	15	18	6	49,000
50,000	15	0	0	15	4	2	15	8	4	15	12	6	15	16	8	16	0	10	16	5	0	50,000
51,000	15	6	0	15	10	3	15	14	6	15	18	9	16	3	0	16	7	3	16	11	6	51,000
52,000	15	12	0	15	16	4	16	0	8	16	5	0	16	9	4	16	13	8	16	18	0	52,000
53,000	15	18	0	16	2	5	16	6	10	16	11	3	16	15	8	17	0	1	17	4	6	53,000
54,000	16	4	0	16	8	6	16	13	0	16	17	6	17	2	0	17	6	6	17	11	0	54,000
55,000	16	10	0	16	14	7	16	19	2	17	3	9	17	8	4	17	12	11	17	17	6	55,000
56,000	16	16	0	17	0	8	17	5	4	17	10	0	17	14	8	17	19	4	18	4	0	56,000
57,000	17	2	0	17	6	9	17	11	6	17	16	3	18	1	0	18	5	9	18	10	6	57,000
58,000	17	8	0	17	12	10	17	17	8	18	2	6	18	7	4	18	12	2	18	17	0	58,000
59,000	17	14	0	17	18	11	18	3	10	18	8	9	18	13	8	18	18	7	19	3	6	59,000
60,000	18	0	0	18	5	0	18	10	0	18	15	0	19	0	0	19	5	0	19	10	0	60,000
61,000	18	6	0	18	11	1	18	16	2	19	1	3	19	6	4	19	11	5	19	16	6	61,000
62,000	18	12	0	18	17	2	19	2	4	19	7	6	19	12	8	19	17	10	20	3	0	62,000
63,000	18	18	0	19	3	3	19	8	6	19	13	9	19	19	0	20	4	3	20	9	6	63,000
64,000	19	4	0	19	9	4	19	14	8	20	0	0	20	5	4	20	10	8	20	16	0	64,000
65,000	19	10	0	19	15	5	20	0	10	20	6	3	20	11	8	20	17	1	21	2	6	65,000
66,000	19	16	0	20	1	6	20	7	0	20	12	6	20	18	0	21	3	6	21	9	0	66,000
67,000	20	2	0	20	7	7	20	13	2	20	18	9	21	4	4	21	9	11	21	15	6	67,000
68,000	20	8	0	20	13	8	20	19	4	21	5	0	21	10	8	21	16	4	22	2	0	68,000
69,000	20	14	0	20	19	9	21	5	6	21	11	3	21	17	0	22	2	9	22	8	6	69,000
70,000	21	0	0	21	5	10	21	11	8	21	17	6	22	3	4	22	9	2	22	15	0	70,000
71,000	21	6	0	21	11	11	21	17	10	22	3	9	22	9	8	22	15	7	23	1	6	71,000
72,000	21	12	0	21	18	0	22	4	0	22	10	0	22	16	0	23	2	0	23	8	0	72,000
73,000	21	18	0	22	4	1	22	10	2	22	16	3	23	2	4	23	8	5	23	14	6	73,000
74,000	22	4	0	22	10	2	22	16	4	23	2	6	23	8	8	23	14	10	24	1	0	74,000
75,000	22	10	0	22	16	3	23	2	6	23	8	9	23	15	0	24	1	3	24	7	6	75,000
76,000	22	16	0	23	2	4	23	8	8	23	15	0	24	1	4	24	7	8	24	14	0	76,000
77,000	23	2	0	23	8	5	23	14	10	24	1	3	24	7	8	24	14	1	25	0	6	77,000
78,000	23	8	0	23	14	6	24	1	0	24	7	6	24	14	0	25	0	6	25	7	0	78,000
79,000	23	14	0	24	0	7	24	7	2	24	13	9	25	0	4	25	6	11	25	13	6	79,000
80,000	24	0	0	24	6	8	24	13	4	25	0	0	25	6	8	25	13	4	26	0	0	80,000
81,000	24	6	0	24	12	9	24	19	6	25	6	3	25	13	0	25	19	9	26	6	6	81,000
82,000	24	12	0	24	18	10	25	5	8	25	12	6	25	19	4	26	6	2	26	13	0	82,000
83,000	24	18	0	25	4	11	25	11	10	25	18	9	26	5	8	26	12	7	26	19	6	83,000
84,000	25	4	0	25	11	0	25	18	0	26	5	0	26	12	0	26	19	0	27	6	0	84,000
85,000	25	10	0	25	17	1	26	4	2	26	11	3	26	18	4	27	5	5	27	12	6	85,000
86,000	25	16	0	26	3	2	26	10	4	26	17	6	27	4	8	27	11	10	27	19	0	86,000
87,000	26	2	0	26	9	3	26	16	6	27	3	9	27	11	0	27	18	3	28	5	6	87,000
88,000	26	8	0	26	15	4	27	2	8	27	10	0	27	17	4	28	4	8	28	12	0	88,000
89,000	26	14	0	27	1	5	27	8	10	27	16	3	28	3	8	28	11	1	28	18	6	89,000
90,000	27	0	0	27	7	6	27	15	0	28	2	6	28	10	0	28	17	6	29	5	0	90,000
91,000	27	6	0	27	13	7	28	1	2	28	8	9	28	16	4	29	3	11	29	11	6	91,000
92,000	27	12	0	27	19	8	28	7	4	28	15	0	29	2	8	29	10	4	29	18	0	92,000
93,000	27	18	0	28	5	9	28	13	6	29	1	3	29	9	0	29	16	9	30	4	6	93,000
94,000	28	4	0	28	11	10	28	19	8	29	7	6	29	15	4	30	3	2	30	11	0	94,000
95,000	28	10	0	28	17	11	29	5	10	29	13	9	30	1	8	30	9	7	30	17	6	95,000
96,000	28	16	0	29	4	0	29	12	0	30	0	0	30	8	0	30	16	0	31	4	0	96,000
97,000	29	2	0	29	10	1	29	18	2	30	6	3	30	14	4	31	2	5	31	10	6	97,000
98,000	29	8	0	29	16	2	30	4	4	30	12	6	31	0	8	31	8	10	31	17	0	98,000
99,000	29	14	0	30	2	3	30	10	6	30	18	9	31	7	0	31	15	3	32	3	6	99,000
100,000	30	0	0	30	8	4	30	16	8	31	5	0	31	13	4	32	1	8	32	10	0	100,000
200,000	60	0	0	60	16	8	61	13	4	62	10	0	63	6	8	64	3	4	65	0	0	200,000
300,000	90	0	0	91	5	0	92	10	0	93	15	0	95	0	0	96	5	0	97	10	0	300,000
400,000	120	0	0	121	13	4	123	6	8	125	0	0	126	13	4	128	6	8	130	0	0	400,000
500,000	150	0	0	152	1	8	154	3	4	156	5	0	158	6	8	160	8	4	162	10	0	500,000
600,000	180	0	0	182	10	0	185	0	0	187	10	0	190	0	0	192	10	0	195	0	0	600,000
700,000	210	0	0	212	18	4	215	16	8	218	15	0	221	13	4	224	11	8	227	10	0	700,000
800,000	240	0	0	243	6	8	246	13	4	250	0	0	253	6	8	256	13	4	260	0	0	800,000
900,000	270	0	0	273	15	0	277	10	0	281	5	0	285	0	0	288	15	0	292	10	0	900,000
1,000,000	300	0	0	304	3	4	308	6	8	312	10	0	316	13	4	320	16	8	325	0	0	1,000,000

DISCOUNT FOR EARLY PAYMENT OF GAS BILLS.

The custom of allowing discount to consumers on gas bills paid either during the first month after the expiration of a quarter, or within a period of 21 or 30 days from the date of the delivery of the account, is becoming very general amongst gas companies.

The most common allowance is at the rate of 10 per cent. on the amount due for gas consumed (excluding the meter-rent), but the premium varies throughout the country from 5 to 20 per cent., some companies adopting a graduated scale of discounts according to the quarterly consumption.

The practice wherever adopted has been found highly beneficial, saving labour in collecting, and reducing the per centage of bad debts.

The following tables show the sum of the discount on bills ranging from 3d. to £100, at the different rates of 5, 7½, 10, 12½, 15, and 20 per cent:—

Table of Discounts on Gas Bills at 5, 7½, 10, 12½, 15, and 20 per Cent.

From 3d. to 2s. 2d.

Amount of Gas Bill.	5 per Cent.	7½ per Cent.	10 per Cent.	12½ per Cent.	15 per Cent.	20 per Cent.	Amount of Gas Bill.
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s, d.	£ s. d.
. . 3	. . .	. . .	. . .	. . .	. . 0½	. . 0½	. . 3
. . 3½	. . .	. . .	. . .	. . 0½	. . 0½	. . 0½	. . 3½
. . 4	. . .	. . .	. . .	. . 0½	. . 0½	. . 0½	. . 4
. . 4½	. . .	. . .	. . 0½	. . 0½	. . 0½	. . 0½	. . 4½
. . 5	. . .	. . .	. . 0	. . 0½	. . 0½	. . 1	. . 5
. . 5½	. . .	. . 0½	. . 0½	. . 0½	. . 0½	. . 1	. . 5½
. . 6	. . .	. . 0½	. . 0½	. . 0½	. . 1	. . 1	. . 6
. . 6½	. . .	. . 0½	. . 0½	. . 0½	. . 1	. . 1	. . 6½
. . 7	. . .	. . 0½	. . 0½	. . 1	. . 1	. . 1½	. . 7
. . 7½	. . .	. . 0½	. . 0½	. . 1	. . 1	. . 1½	. . 7½
. . 8	. . 0½	. . 0½	. . 1	. . 1	. . 1	. . 1½	. . 8
. . 8½	. . 0½	. . 0½	. . 1	. . 1	. . 1	. . 1½	. . 8½
. . 9	. . 0½	. . 0½	. . 1	. . 1	. . 1½	. . 2	. . 9
. . 9½	. . 0½	. . 0½	. . 1	. . 1	. . 1½	. . 2	. . 9½
. . 10	. . 0½	. . 0½	. . 1	. . 1	. . 1½	. . 2	. . 10
. . 10½	. . 0½	. . 0½	. . 1	. . 1	. . 1½	. . 2	. . 10½
. . 11	. . 0½	. . 1	. . 1	. . 1½	. . 1½	. . 2	. . 11
. . 11½	. . 0½	. . 1	. . 1	. . 1½	. . 1½	. . 2	. . 11½
. 1 0	. . 0½	. . 1	. . 1	. . 1½	. . 2	. . 2½	. 1 0
. 1 0½	. . 0½	. . 1	. . 1	. . 1½	. . 2	. . 2½	. 1 0½
. 1 1	. . 0½	. . 1	. . 1	. . 1½	. . 2	. . 2½	. 1 1
. 1 1½	. . 0½	. . 1	. . 1	. . 1½	. . 2	. . 2½	. 1 1½
. 1 2	. . 0½	. . 1	. . 1½	. . 1½	. . 2	. . 3	. 1 2
. 1 2½	. . 0½	. . 1	. . 1½	. . 1½	. . 2	. . 3	. 1 2½
. 1 3	. . 0½	. . 1	. . 1½	. . 2	. . 2	. . 3	. 1 3
. 1 3½	. . 0½	. . 1	. . 1½	. . 2	. . 2½	. . 3	. 1 3½
. 1 4	. . 1	. . 1	. . 1½	. . 2	. . 2½	. . 3	. 1 4
. 1 4½	. . 1	. . 1	. . 1½	. . 2	. . 2½	. . 3	. 1 4½
. 1 5	. . 1	. . 1	. . 1½	. . 2	. . 2½	. . 3½	. 1 5
. 1 5½	. . 1	. . 1	. . 1½	. . 2	. . 2½	. . 3½	. 1 5½
. 1 6	. . 1	. . 1½	. . 2	. . 2	. . 2½	. . 3½	. 1 6
. 1 6½	. . 1	. . 1½	. . 2	. . 2½	. . 2½	. . 3½	. 1 6½
. 1 7	. . 1	. . 1½	. . 2	. . 2½	. . 3	. . 3½	. 1 7
. 1 7½	. . 1	. . 1½	. . 2	. . 2½	. . 3	. . 3½	. 1 7½
. 1 8	. . 1	. . 1½	. . 2	. . 2½	. . 3	. . 4	. 1 8
. 1 8½	. . 1	. . 1½	. . 2	. . 2½	. . 3	. . 4	. 1 8½
. 1 9	. . 1	. . 1½	. . 2	. . 2½	. . 3	. . 4	. 1 9
. 1 9½	. . 1	. . 1½	. . 2	. . 2½	. . 3	. . 4	. 1 9½
. 1 10	. . 1	. . 1½	. . 2	. . 2½	. . 3	. . 4	. 1 10
. 1 10½	. . 1	. . 1½	. . 2	. . 3	. . 3½	. . 4½	. 1 10½
. 1 11	. . 1	. . 1½	. . 2	. . 3	. . 3½	. . 4½	. 1 11
. 1 11½	. . 1	. . 1½	. . 2½	. . 3	. . 3½	. . 4½	. 1 11½
. 2 0	. . 1	. . 2	. . 2½	. . 3	. . 3½	. . 5	. 2 0
. 2 0½	. . 1	. . 2	. . 2½	. . 3	. . 3½	. . 5	. 2 0½
. 2 1	. . 1	. . 2	. . 2½	. . 3	. . 3½	. . 5	. 2 1
. 2 1½	. . 1	. . 2	. . 2½	. . 3	. . 3½	. . 5	. 2 1½
. 2 2	. . 1	. . 2	. . 2½	. . 3	. . 4	. . 5	. 2 2

Table of Discounts on Gas Bills at 5, 7½, 10, 12½, 15, and 20 per Cent.
From 2s. 2½d. to 5s. 0d.

Amount of Gas Bill.	5 per Cent.	7½ per Cent.	10 per Cent.	12½ per Cent.	15 per Cent.	20 per Cent.	Amount of Gas Bill.
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
. 2 2½	. . 1	. . 2	. . 2½	. . 3½	. . 4	. . 5	. 2 2½
. 2 3	. . 1	. . 2	. . 2½	. . 3½	. . 4	. . 5	. 2 3
. 2 3½	. . 1½	. . 2	. . 2½	. . 3½	. . 4	. . 5½	. 2 3½
. 2 4	. . 1½	. . 2	. . 3	. . 3½	. . 4	. . 5½	. 2 4
. 2 4½	. . 1½	. . 2	. . 3	. . 3½	. . 4	. . 5½	. 2 4½
. 2 5	. . 1½	. . 2	. . 3	. . 3½	. . 4	. . 5½	. 2 5
. 2 5½	. . 1½	. . 2	. . 3	. . 3½	. . 4½	. . 5½	. 2 5½
. 2 6	. . 1½	. . 2	. . 3	. . 3½	. . 4½	. . 6	. 2 6
. 2 6½	. . 1½	. . 2	. . 3	. . 4	. . 4½	. . 6	. 2 6½
. 2 7	. . 1½	. . 2	. . 3	. . 4	. . 4½	. . 6	. 2 7
. 2 7½	. . 1½	. . 2	. . 3	. . 4	. . 4½	. . 6	. 2 7½
. 2 8	. . 1½	. . 2	. . 3	. . 4	. . 4½	. . 6	. 2 8
. 2 8½	. . 1½	. . 2½	. . 3	. . 4	. . 4½	. . 6½	. 2 8½
. 2 9	. . 1½	. . 2½	. . 3½	. . 4	. . 5	. . 6½	. 2 9
. 2 9½	. . 1½	. . 2½	. . 3½	. . 4	. . 5	. . 6½	. 2 9½
. 2 10	. . 1½	. . 2½	. . 3½	. . 4	. . 5	. . 6½	. 2 10
. 2 10½	. . 1½	. . 2½	. . 3½	. . 4½	. . 5	. . 6½	. 2 10½
. 2 11	. . 1½	. . 2½	. . 3½	. . 4½	. . 5	. . 7	. 2 11
. 2 11½	. . 1½	. . 2½	. . 3½	. . 4½	. . 5	. . 7	. 2 11½
. 3 0	. . 2	. . 2½	. . 3½	. . 4½	. . 5½	. . 7	. 3 0
. 3 0½	. . 2	. . 2½	. . 3½	. . 4½	. . 5½	. . 7	. 3 0½
. 3 1	. . 2	. . 2½	. . 3½	. . 4½	. . 5½	. . 7	. 3 1
. 3 1½	. . 2	. . 2½	. . 3½	. . 4½	. . 5½	. . 7½	. 3 1½
. 3 2	. . 2	. . 2½	. . 4	. . 4½	. . 5½	. . 7½	. 3 2
. 3 2½	. . 2	. . 2½	. . 4	. . 4½	. . 5½	. . 7½	. 3 2½
. 3 3	. . 2	. . 2½	. . 4	. . 5	. . 5½	. . 7½	. 3 3
. 3 3½	. . 2	. . 3	. . 4	. . 5	. . 6	. . 7½	. 3 3½
. 3 4	. . 2	. . 3	. . 4	. . 5	. . 6	. . 8	. 3 4
. 3 4½	. . 2	. . 3	. . 4	. . 5	. . 6	. . 8	. 3 4½
. 3 5	. . 2	. . 3	. . 4	. . 5	. . 6	. . 8	. 3 5
. 3 5½	. . 2	. . 3	. . 4	. . 5	. . 6	. . 8	. 3 5½
. 3 6	. . 2	. . 3	. . 4	. . 5	. . 6	. . 8½	. 3 6
. 3 6½	. . 2	. . 3	. . 4	. . 5½	. . 6	. . 8½	. 3 6½
. 3 7	. . 2	. . 3	. . 4½	. . 5½	. . 6½	. . 8½	. 3 7
. 3 7½	. . 2	. . 3	. . 4½	. . 5½	. . 6½	. . 8½	. 3 7½
. 3 8	. . 2	. . 3	. . 4½	. . 5½	. . 6½	. . 8½	. 3 8
. 3 8½	. . 2	. . 3	. . 4½	. . 5½	. . 6½	. . 8½	. 3 8½
. 3 9	. . 2	. . 3	. . 4½	. . 5½	. . 6½	. . 9	. 3 9
. 3 9½	. . 2	. . 3½	. . 4½	. . 5½	. . 6½	. . 9	. 3 9½
. 3 10	. . 2	. . 3½	. . 4½	. . 6	. . 7	. . 9	. 3 10
. 3 10½	. . 2½	. . 3½	. . 4½	. . 6	. . 7	. . 9	. 3 10½
. 3 11	. . 2½	. . 3½	. . 4½	. . 6	. . 7	. . 9½	. 3 11
. 3 11½	. . 2½	. . 3½	. . 4½	. . 6	. . 7	. . 9½	. 3 11½
. 4 0	. . 2½	. . 3½	. . 5	. . 6	. . 7	. . 9½	. 4 0
. 4 0½	. . 2½	. . 3½	. . 5	. . 6	. . 7	. . 9½	. 4 0½
. 4 1	. . 2½	. . 3½	. . 5	. . 6	. . 7	. . 10	. 4 1
. 4 1½	. . 2½	. . 3½	. . 5	. . 6	. . 7½	. . 10	. 4 1½
. 4 2	. . 2½	. . 3½	. . 5	. . 6	. . 7½	. . 10	. 4 2
. 4 2½	. . 2½	. . 3½	. . 5	. . 6	. . 7½	. . 10	. 4 2½
. 4 3	. . 2½	. . 4	. . 5	. . 6½	. . 7½	. . 10	. 4 3
. 4 3½	. . 2½	. . 4	. . 5	. . 6½	. . 7½	. . 10	. 4 3½
. 4 4	. . 2½	. . 4	. . 5	. . 6½	. . 7½	. . 10½	. 4 4
. 4 4½	. . 2½	. . 4	. . 5	. . 6½	. . 8	. . 10½	. 4 4½
. 4 5	. . 2½	. . 4	. . 5	. . 6½	. . 8	. . 10½	. 4 5
. 4 5½	. . 2½	. . 4	. . 5	. . 6½	. . 8	. . 10½	. 4 5½
. 4 6	. . 2½	. . 4	. . 5½	. . 6½	. . 8	. . 11	. 4 6
. 4 6½	. . 2½	. . 4	. . 5½	. . 6½	. . 8	. . 11	. 4 6½
. 4 7	. . 2½	. . 4	. . 5½	. . 7	. . 8	. . 11	. 4 7
. 4 7½	. . 2½	. . 4	. . 5½	. . 7	. . 8	. . 11	. 4 7½
. 4 8	. . 3	. . 4	. . 5½	. . 7	. . 8	. . 11	. 4 8
. 4 8½	. . 3	. . 4	. . 5½	. . 7	. . 8½	. . 11	. 4 8½
. 4 9	. . 3	. . 4	. . 5½	. . 7	. . 8½	. . 11½	. 4 9
. 4 9½	. . 3	. . 4½	. . 5½	. . 7	. . 8½	. . 11½	. 4 9½
. 4 10	. . 3	. . 4½	. . 6	. . 7	. . 8½	. . 11½	. 4 10
. 4 10½	. . 3	. . 4½	. . 6	. . 7	. . 8½	. . 11½	. 4 10½
. 4 11	. . 3	. . 4½	. . 6	. . 7½	. . 9	. 1 0	. 4 11
. 4 11½	. . 3	. . 4½	. . 6	. . 7½	. . 9	. 1 0	. 4 11½
. 5 0	. . 3	. . 4½	. . 6	. . 7½	. . 9	. 1 0	. 5 0

Table of Discounts on Gas Bills at 5, 7½, 10, 12½, 15, and 20 per Cent.

From 5s. 0½d. to 7s. 10d.

Amount of Gas Bill.			5 per Cent.			7½ per Cent.			10 per Cent.			12½ per Cent.			15 per Cent.			20 per Cent.			Amount of Gas Bill.		
£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
.	5	0½	.	.	3	.	.	4½	.	.	6	.	.	7½	.	.	9	.	1	0	.	5	0½
.	5	1	.	.	3	.	.	4½	.	.	6	.	.	7½	.	.	9	.	1	0	.	5	1
.	5	1½	.	.	3	.	.	4½	.	.	6	.	.	7½	.	.	9	.	1	0	.	5	1½
.	5	2	.	.	3	.	.	4½	.	.	6	.	.	7½	.	.	9	.	1	0	.	5	2
.	5	2½	.	.	3	.	.	4½	.	.	6	.	.	7½	.	.	9½	.	1	0½	.	5	2½
.	5	3	.	.	3	.	.	4½	.	.	6	.	.	8	.	.	9½	.	1	0½	.	5	3
.	5	3½	.	.	3	.	.	4½	.	.	6½	.	.	8	.	.	9½	.	1	0½	.	5	3½
.	5	4	.	.	3	.	.	5	.	.	6½	.	.	8	.	.	9½	.	1	0½	.	5	4
.	5	4½	.	.	3	.	.	5	.	.	6½	.	.	8	.	.	9½	.	1	0½	.	5	4½
.	5	5	.	.	3	.	.	5	.	.	6½	.	.	8	.	.	9½	.	1	1	.	5	5
.	5	5½	.	.	3	.	.	5	.	.	6½	.	.	8	.	.	10	.	1	1	.	5	5½
.	5	6	.	.	3	.	.	5	.	.	6½	.	.	8	.	.	10	.	1	1	.	5	6
.	5	6½	.	.	3	.	.	5	.	.	6½	.	.	8	.	.	10	.	1	1	.	5	6½
.	5	7	.	.	3½	.	.	5	.	.	6½	.	.	8½	.	.	10	.	1	1½	.	5	7
.	5	7½	.	.	3½	.	.	5	.	.	6½	.	.	8½	.	.	10	.	1	1½	.	5	7½
.	5	8	.	.	3½	.	.	5	.	.	7	.	.	8½	.	.	10	.	1	1½	.	5	8
.	5	8½	.	.	3½	.	.	5	.	.	7	.	.	8½	.	.	10	.	1	1½	.	5	8½
.	5	9	.	.	3½	.	.	5	.	.	7	.	.	8½	.	.	10	.	1	2	.	5	9
.	5	9½	.	.	3½	.	.	5	.	.	7	.	.	8½	.	.	10½	.	1	2	.	5	9½
.	5	10	.	.	3½	.	.	5	.	.	7	.	.	8½	.	.	10½	.	1	2	.	5	10
.	5	10½	.	.	3½	.	.	5½	.	.	7	.	.	8½	.	.	10½	.	1	2	.	5	10½
.	5	11	.	.	3½	.	.	5½	.	.	7	.	.	9	.	.	10½	.	1	2	.	5	11
.	5	11½	.	.	3½	.	.	5½	.	.	7	.	.	9	.	.	10½	.	1	2½	.	5	11½
.	6	0	.	.	3½	.	.	5½	.	.	7	.	.	9	.	.	11	.	1	2½	.	6	0
.	6	0½	.	.	3½	.	.	5½	.	.	7	.	.	9	.	.	11	.	1	2½	.	6	0½
.	6	1	.	.	3½	.	.	5½	.	.	7	.	.	9	.	.	11	.	1	2½	.	6	1
.	6	1½	.	.	3½	.	.	5½	.	.	7½	.	.	9	.	.	11	.	1	2½	.	6	1½
.	6	2	.	.	3½	.	.	5½	.	.	7½	.	.	9	.	.	11	.	1	3	.	6	2
.	6	2½	.	.	3½	.	.	5½	.	.	7½	.	.	9	.	.	11	.	1	3	.	6	2½
.	6	3	.	.	3½	.	.	5½	.	.	7½	.	.	9½	.	.	11	.	1	3	.	6	3
.	6	3½	.	.	3½	.	.	5½	.	.	7½	.	.	9½	.	.	11½	.	1	3	.	6	3½
.	6	4	.	.	4	.	.	5½	.	.	7½	.	.	9½	.	.	11½	.	1	3	.	6	4
.	6	4½	.	.	4	.	.	5½	.	.	7½	.	.	9½	.	.	11½	.	1	3½	.	6	4½
.	6	5	.	.	4	.	.	6	.	.	7½	.	.	9½	.	.	11½	.	1	3½	.	6	5
.	6	5½	.	.	4	.	.	6	.	.	7½	.	.	9½	.	.	11½	.	1	3½	.	6	5½
.	6	6	.	.	4	.	.	6	.	.	8	.	.	9½	.	.	11½	.	1	3½	.	6	6
.	6	6½	.	.	4	.	.	6	.	.	8	.	.	10	.	.	11½	.	1	3½	.	6	6½
.	6	7	.	.	4	.	.	6	.	.	8	.	.	10	.	1	0	.	1	4	.	6	7
.	6	7½	.	.	4	.	.	6	.	.	8	.	.	10	.	1	0	.	1	4	.	6	7½
.	6	8	.	.	4	.	.	6	.	.	8	.	.	10	.	1	0	.	1	4	.	6	8
.	6	8½	.	.	4	.	.	6	.	.	8	.	.	10	.	1	0	.	1	4	.	6	8½
.	6	9	.	.	4	.	.	6	.	.	8	.	.	10	.	1	0	.	1	4	.	6	9
.	6	9½	.	.	4	.	.	6	.	.	8	.	.	10	.	1	0	.	1	4	.	6	9½
.	6	10	.	.	4	.	.	6	.	.	8	.	.	10	.	1	0	.	1	4½	.	6	10
.	6	10½	.	.	4	.	.	6	.	.	8	.	.	10½	.	1	0½	.	1	4½	.	6	10½
.	6	11	.	.	4	.	.	6	.	.	8	.	.	10½	.	1	0½	.	1	4½	.	6	11
.	6	11½	.	.	4	.	.	6	.	.	8½	.	.	10½	.	1	0½	.	1	4½	.	6	11½
.	7	0	.	.	4	.	.	6½	.	.	8½	.	.	10½	.	1	0½	.	1	5	.	7	0
.	7	0½	.	.	4	.	.	6½	.	.	8½	.	.	10½	.	1	0½	.	1	5	.	7	0½
.	7	1	.	.	4	.	.	6½	.	.	8½	.	.	10½	.	1	0½	.	1	5	.	7	1
.	7	1½	.	.	4	.	.	6½	.	.	8½	.	.	10½	.	1	0½	.	1	5	.	7	1½
.	7	2	.	.	4½	.	.	6½	.	.	8½	.	.	11	.	1	1	.	1	5	.	7	2
.	7	2½	.	.	4½	.	.	6½	.	.	8½	.	.	11	.	1	1	.	1	5	.	7	2½
.	7	3	.	.	4½	.	.	6½	.	.	8½	.	.	11	.	1	1	.	1	5½	.	7	3
.	7	3½	.	.	4½	.	.	6½	.	.	8½	.	.	11	.	1	1	.	1	5½	.	7	3½
.	7	4	.	.	4½	.	.	6½	.	.	9	.	.	11	.	1	1	.	1	5½	.	7	4
.	7	4½	.	.	4½	.	.	6½	.	.	9	.	.	11	.	1	1	.	1	5½	.	7	4½
.	7	5	.	.	4½	.	.	6½	.	.	9	.	.	11	.	1	1	.	1	6	.	7	5
.	7	5½	.	.	4½	.	.	6½	.	.	9	.	.	11	.	1	1½	.	1	6	.	7	5½
.	7	6	.	.	4½	.	.	6½	.	.	9	.	.	11	.	1	1½	.	1	6	.	7	6
.	7	6½	.	.	4½	.	.	6½	.	.	9	.	.	11½	.	1	1½	.	1	6	.	7	6½
.	7	7	.	.	4½	.	.	7	.	.	9	.	.	11½	.	1	1½	.	1	6	.	7	7
.	7	7½	.	.	4½	.	.	7	.	.	9	.	.	11½	.	1	1½	.	1	6½	.	7	7½
.	7	8	.	.	4½	.	.	7	.	.	9	.	.	11½	.	1	1½	.	1	6½	.	7	8
.	7	8½	.	.	4½	.	.	7	.	.	9	.	.	11½	.	1	1½	.	1	6½	.	7	8½
.	7	9	.	.	4½	.	.	7	.	.	9	.	.	11½	.	1	2	.	1	6½	.	7	9
.	7	9½	.	.	4½	.	.	7	.	.	9½	.	.	11½	.	1	2	.	1	6½	.	7	9½
.	7	10	.	.	4½	.	.	7	.	.	9½	.	1	0	.	1	2	.	1	7	.	7	10

Table of Discounts on Gas Bills at 5, 7½, 10, 12½, 15, and 20 per Cent. From 7s. 10½d. to 10s. 8d.

Amount of Gas Bill.	5 per Cent.	7½ per Cent.	10 per Cent.	12½ per Cent.	15 per Cent.	20 per Cent.	Amount of Gas Bill.
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
. 7 10½	. . 4½	. . 7	. . 9½	. 1 0	. 1 2	. 1 7	. 7 10½
. 7 11	. . 4½	. . 7	. . 9½	. 1 0	. 1 2	. 1 7	. 7 11
. 7 11½	. . 4½	. . 7	. . 9½	. 1 0	. 1 2	. 1 7	. 7 11½
. 8 0	. . 5	. . 7	. . 9½	. 1 0	. 1 2½	. 1 7	. 8 0
. 8 0½	. . 5	. . 7	. . 9½	. 1 0	. 1 2½	. 1 7	. 8 0½
. 8 1	. . 5	. . 7	. . 9½	. 1 0	. 1 2½	. 1 7	. 8 1
. 8 1½	. . 5	. . 7	. . 9½	. 1 0	. 1 2½	. 1 7½	. 8 1½
. 8 2	. . 5	. . 7½	. . 10	. 1 0½	. 1 2½	. 1 7½	. 8 2
. 8 2½	. . 5	. . 7½	. . 10	. 1 0½	. 1 2½	. 1 7½	. 8 2½
. 8 3	. . 5	. . 7½	. . 10	. 1 0½	. 1 3	. 1 7½	. 8 3
. 8 3½	. . 5	. . 7½	. . 10	. 1 0½	. 1 3	. 1 8	. 8 3½
. 8 4	. . 5	. . 7½	. . 10	. 1 0½	. 1 3	. 1 8	. 8 4
. 8 4½	. . 5	. . 7½	. . 10	. 1 0½	. 1 3	. 1 8	. 8 4½
. 8 5	. . 5	. . 7½	. . 10	. 1 0½	. 1 3	. 1 8	. 8 5
. 8 5½	. . 5	. . 7½	. . 10	. 1 0½	. 1 3	. 1 8	. 8 5½
. 8 6	. . 5	. . 7½	. . 10	. 1 0½	. 1 3	. 1 8½	. 8 6
. 8 6½	. . 5	. . 7½	. . 10	. 1 1	. 1 3½	. 1 8½	. 8 6½
. 8 7	. . 5	. . 7½	. . 10	. 1 1	. 1 3½	. 1 8½	. 8 7
. 8 7½	. . 5	. . 7½	. . 10½	. 1 1	. 1 3½	. 1 8½	. 8 7½
. 8 8	. . 5	. . 7½	. . 10½	. 1 1	. 1 3½	. 1 9	. 8 8
. 8 8½	. . 5	. . 7½	. . 10½	. 1 1	. 1 3½	. 1 9	. 8 8½
. 8 9	. . 5	. . 8	. . 10½	. 1 1	. 1 3½	. 1 9	. 8 9
. 8 9½	. . 5	. . 8	. . 10½	. 1 1	. 1 3½	. 1 9	. 8 9½
. 8 10	. . 5	. . 8	. . 10½	. 1 1	. 1 4	. 1 9	. 8 10
. 8 10½	. . 5	. . 8	. . 10½	. 1 1	. 1 4	. 1 9½	. 8 10½
. 8 11	. . 5½	. . 8	. . 10½	. 1 1½	. 1 4	. 1 9½	. 8 11
. 8 11½	. . 5½	. . 8	. . 10½	. 1 1½	. 1 4	. 1 9½	. 8 11½
. 9 0	. . 5½	. . 8	. . 11	. 1 1½	. 1 4	. 1 9½	. 9 0
. 9 0½	. . 5½	. . 8	. . 11	. 1 1½	. 1 4	. 1 9½	. 9 0½
. 9 1	. . 5½	. . 8	. . 11	. 1 1½	. 1 4	. 1 10	. 9 1
. 9 1½	. . 5½	. . 8	. . 11	. 1 1½	. 1 4½	. 1 10	. 9 1½
. 9 2	. . 5½	. . 8	. . 11	. 1 1½	. 1 4½	. 1 10	. 9 2
. 9 2½	. . 5½	. . 8	. . 11	. 1 1½	. 1 4½	. 1 10	. 9 2½
. 9 3	. . 5½	. . 8	. . 11	. 1 1½	. 1 4½	. 1 10	. 9 3
. 9 3½	. . 5½	. . 8½	. . 11	. 1 2	. 1 4½	. 1 10	. 9 3½
. 9 4	. . 5½	. . 8½	. . 11	. 1 2	. 1 4½	. 1 10½	. 9 4
. 9 4½	. . 5½	. . 8½	. . 11	. 1 2	. 1 4½	. 1 10½	. 9 4½
. 9 5	. . 5½	. . 8½	. . 11	. 1 2	. 1 5	. 1 10½	. 9 5
. 9 5½	. . 5½	. . 8½	. . 11½	. 1 2	. 1 5	. 1 10½	. 9 5½
. 9 6	. . 5½	. . 8½	. . 11½	. 1 2	. 1 5	. 1 11	. 9 6
. 9 6½	. . 5½	. . 8½	. . 11½	. 1 2	. 1 5	. 1 11	. 9 6½
. 9 7	. . 5½	. . 8½	. . 11½	. 1 2½	. 1 5	. 1 11	. 9 7
. 9 7½	. . 5½	. . 8½	. . 11½	. 1 2½	. 1 5	. 1 11	. 9 7½
. 9 8	. . 6	. . 8½	. . 11½	. 1 2½	. 1 5	. 1 11	. 9 8
. 9 8½	. . 6	. . 8½	. . 11½	. 1 2½	. 1 5½	. 1 11	. 9 8½
. 9 9	. . 6	. . 8½	. . 11½	. 1 2½	. 1 5½	. 1 11½	. 9 9
. 9 9½	. . 6	. . 8½	. . 11½	. 1 2½	. 1 5½	. 1 11½	. 9 9½
. 9 10	. . 6	. . 9	. . 11½	. 1 2½	. 1 5½	. 1 11½	. 9 10
. 9 10½	. . 6	. . 9	. 1 0	. 1 2½	. 1 5½	. 1 11½	. 9 10½
. 9 11	. . 6	. . 9	. 1 0	. 1 3	. 1 5½	. 1 11½	. 9 11
. 9 11½	. . 6	. . 9	. 1 0	. 1 3	. 1 6	. 1 11½	. 9 11½
. 10 0	. . 6	. . 9	. 1 0	. 1 3	. 1 6	. 2 0	. 10 0
. 10 0½	. . 6	. . 9	. 1 0	. 1 3	. 1 6	. 2 0	. 10 0½
. 10 1	. . 6	. . 9	. 1 0	. 1 3	. 1 6	. 2 0	. 10 1
. 10 1½	. . 6	. . 9	. 1 0	. 1 3	. 1 6	. 2 0	. 10 1½
. 10 2	. . 6	. . 9	. 1 0	. 1 3	. 1 6	. 2 0½	. 10 2
. 10 2½	. . 6	. . 9	. 1 0	. 1 3	. 1 6½	. 2 0½	. 10 2½
. 10 3	. . 6	. . 9	. 1 0	. 1 3	. 1 6½	. 2 0½	. 10 3
. 10 3½	. . 6	. . 9	. 1 0	. 1 3½	. 1 6½	. 2 0½	. 10 3½
. 10 4	. . 6	. . 9	. 1 0½	. 1 3½	. 1 6½	. 2 1	. 10 4
. 10 4½	. . 6	. . 9½	. 1 0½	. 1 3½	. 1 6½	. 2 1	. 10 4½
. 10 5	. . 6	. . 9½	. 1 0½	. 1 3½	. 1 6½	. 2 1	. 10 5
. 10 5½	. . 6	. . 9½	. 1 0½	. 1 3½	. 1 6½	. 2 1	. 10 5½
. 10 6	. . 6	. . 9½	. 1 0½	. 1 3½	. 1 7	. 2 1	. 10 6
. 10 6½	. . 6	. . 9½	. 1 0½	. 1 3½	. 1 7	. 2 1	. 10 6½
. 10 7	. . 6	. . 9½	. 1 0½	. 1 4	. 1 7	. 2 1	. 10 7
. 10 7½	. . 6	. . 9½	. 1 0½	. 1 4	. 1 7	. 2 1½	. 10 7½
. 10 8	. . 6½	. . 9½	. 1 0½	. 1 4	. 1 7	. 2 1½	. 10 8

Table of Discounts on Gas Bills at 5, 7½, 10, 12½, 15, and 20 per Cent.

From 10s. 8½d. to 13s. 6d.

Amount of Gas Bill.			5 per Cent.			7½ per Cent.			10 per Cent.			12½ per Cent.			15 per Cent.			20 per Cent.			Amount of Gas Bill.		
£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
.	10	8½	.	.	6½	.	.	9½	.	1	1	.	1	4	.	1	7	.	2	1½	.	10	8½
.	10	9	.	.	6½	.	.	9½	.	1	1	.	1	4	.	1	7½	.	2	1½	.	10	9
.	10	9½	.	.	6½	.	.	9½	.	1	1	.	1	4	.	1	7½	.	2	1½	.	10	9½
.	10	10	.	.	6½	.	.	9½	.	1	1	.	1	4	.	1	7½	.	2	2	.	10	10
.	10	10½	.	.	6½	.	.	9½	.	1	1	.	1	4	.	1	7½	.	2	2	.	10	10½
.	10	11	.	.	6½	.	.	10	.	1	1	.	1	4½	.	1	7½	.	2	2	.	10	11
.	10	11½	.	.	6½	.	.	10	.	1	1	.	1	4½	.	1	7½	.	2	2	.	10	11½
.	11	0	.	.	6½	.	.	10	.	1	1	.	1	4½	.	1	8	.	2	2½	.	11	0
.	11	0½	.	.	6½	.	.	10	.	1	1	.	1	4½	.	1	8	.	2	2½	.	11	0½
.	11	1	.	.	6½	.	.	10	.	1	1	.	1	4½	.	1	8	.	2	2½	.	11	1
.	11	1½	.	.	6½	.	.	10	.	1	1½	.	1	4½	.	1	8	.	2	2½	.	11	1½
.	11	2	.	.	6½	.	.	10	.	1	1½	.	1	4½	.	1	8	.	2	3	.	11	2
.	11	2½	.	.	6½	.	.	10	.	1	1½	.	1	4½	.	1	8	.	2	3	.	11	2½
.	11	3	.	.	6½	.	.	10	.	1	1½	.	1	5	.	1	8	.	2	3	.	11	3
.	11	3½	.	.	6½	.	.	10	.	1	1½	.	1	5	.	1	8½	.	2	3	.	11	3½
.	11	4	.	.	6½	.	.	10	.	1	1½	.	1	5	.	1	8½	.	2	3	.	11	4
.	11	4½	.	.	6½	.	.	10	.	1	1½	.	1	5	.	1	8½	.	2	3½	.	11	4½
.	11	5	.	.	7	.	.	10	.	1	1½	.	1	5	.	1	8½	.	2	3½	.	11	5
.	11	5½	.	.	7	.	.	10½	.	1	1½	.	1	5	.	1	8½	.	2	3½	.	11	5½
.	11	6	.	.	7	.	.	10½	.	1	2	.	1	5	.	1	8½	.	2	3½	.	11	6
.	11	6½	.	.	7	.	.	10½	.	1	2	.	1	5	.	1	8½	.	2	3½	.	11	6½
.	11	7	.	.	7	.	.	10½	.	1	2	.	1	5	.	1	9	.	2	4	.	11	7
.	11	7½	.	.	7	.	.	10½	.	1	2	.	1	5½	.	1	9	.	2	4	.	11	7½
.	11	8	.	.	7	.	.	10½	.	1	2	.	1	5½	.	1	9	.	2	4	.	11	8
.	11	8½	.	.	7	.	.	10½	.	1	2	.	1	5½	.	1	9	.	2	4	.	11	8½
.	11	9	.	.	7	.	.	10½	.	1	2	.	1	5½	.	1	9	.	2	4	.	11	9
.	11	9½	.	.	7	.	.	10½	.	1	2	.	1	5½	.	1	9	.	2	4½	.	11	9½
.	11	10	.	.	7	.	.	10½	.	1	2	.	1	5½	.	1	9	.	2	4½	.	11	10
.	11	10½	.	.	7	.	.	10½	.	1	2	.	1	5½	.	1	9½	.	2	4½	.	11	10½
.	11	11	.	.	7	.	.	10½	.	1	2	.	1	6	.	1	9½	.	2	4½	.	11	11
.	11	11½	.	.	7	.	.	10½	.	1	2½	.	1	6	.	1	9½	.	2	4½	.	11	11½
.	12	0	.	.	7	.	.	11	.	1	2½	.	1	6	.	1	9½	.	2	5	.	12	0
.	12	0½	.	.	7	.	.	11	.	1	2½	.	1	6	.	1	9½	.	2	5	.	12	0½
.	12	1	.	.	7	.	.	11	.	1	2½	.	1	6	.	1	9½	.	2	5	.	12	1
.	12	1½	.	.	7	.	.	11	.	1	2½	.	1	6	.	1	9½	.	2	5	.	12	1½
.	12	2	.	.	7	.	.	11	.	1	2½	.	1	6	.	1	10	.	2	5	.	12	2
.	12	2½	.	.	7½	.	.	11	.	1	2½	.	1	6	.	1	10	.	2	5	.	12	2½
.	12	3	.	.	7½	.	.	11	.	1	2½	.	1	6½	.	1	10	.	2	5½	.	12	3
.	12	3½	.	.	7½	.	.	11	.	1	2½	.	1	6½	.	1	10	.	2	5½	.	12	3½
.	12	4	.	.	7½	.	.	11	.	1	3	.	1	6½	.	1	10	.	2	5½	.	12	4
.	12	4½	.	.	7½	.	.	11	.	1	3	.	1	6½	.	1	10	.	2	5½	.	12	4½
.	12	5	.	.	7½	.	.	11	.	1	3	.	1	6½	.	1	10	.	2	6	.	12	5
.	12	5½	.	.	7½	.	.	11	.	1	3	.	1	6½	.	1	10½	.	2	6	.	12	5½
.	12	6	.	.	7½	.	.	11	.	1	3	.	1	6½	.	1	10½	.	2	6	.	12	6
.	12	6½	.	.	7½	.	.	11½	.	1	3	.	1	6½	.	1	10½	.	2	6	.	12	6½
.	12	7	.	.	7½	.	.	11½	.	1	3	.	1	7	.	1	10½	.	2	6	.	12	7
.	12	7½	.	.	7½	.	.	11½	.	1	3	.	1	7	.	1	10½	.	2	6½	.	12	7½
.	12	8	.	.	7½	.	.	11½	.	1	3	.	1	7	.	1	10½	.	2	6½	.	12	8
.	12	8½	.	.	7½	.	.	11½	.	1	3	.	1	7	.	1	10½	.	2	6½	.	12	8½
.	12	9	.	.	7½	.	.	11½	.	1	3	.	1	7	.	1	11	.	2	6½	.	12	9
.	12	9½	.	.	7½	.	.	11½	.	1	3	.	1	7	.	1	11	.	2	6½	.	12	9½
.	12	10	.	.	7½	.	.	11½	.	1	3½	.	1	7	.	1	11	.	2	7	.	12	10
.	12	10½	.	.	7½	.	.	11½	.	1	3½	.	1	7	.	1	11	.	2	7	.	12	10½
.	12	11	.	.	7½	.	.	11½	.	1	3½	.	1	7½	.	1	11	.	2	7	.	12	11
.	12	11½	.	.	7½	.	.	11½	.	1	3½	.	1	7½	.	1	11	.	2	7	.	12	11½
.	13	0	.	.	8	.	.	11½	.	1	3½	.	1	7½	.	1	11½	.	2	7	.	13	0
.	13	0½	.	.	8	.	.	11½	.	1	3½	.	1	7½	.	1	11½	.	2	7	.	13	0½
.	13	1	.	.	8	.	1	0	.	1	3½	.	1	7½	.	1	11½	.	2	7	.	13	1
.	13	1½	.	.	8	.	1	0	.	1	3½	.	1	7½	.	1	11½	.	2	7½	.	13	1½
.	13	2	.	.	8	.	1	0	.	1	4	.	1	7½	.	1	11½	.	2	7½	.	13	2
.	13	2½	.	.	8	.	1	0	.	1	4	.	1	7½	.	1	11½	.	2	7½	.	13	2½
.	13	3	.	.	8	.	1	0	.	1	4	.	1	8	.	2	0	.	2	7½	.	13	3
.	13	3½	.	.	8	.	1	0	.	1	4	.	1	8	.	2	0	.	2	7½	.	13	3½
.	13	4	.	.	8	.	1	0	.	1	4	.	1	8	.	2	0	.	2	8	.	13	4
.	13	4½	.	.	8	.	1	0	.	1	4	.	1	8	.	2	0	.	2	8	.	13	4½
.	13	5	.	.	8	.	1	0	.	1	4	.	1	8	.	2	0	.	2	8	.	13	5
.	13	5½	.	.	8	.	1	0	.	1	4	.	1	8	.	2	0	.	2	8	.	13	5½
.	13	6	.	.	8	.	1	0	.	1	4	.	1	8	.	2	0	.	2	8½	.	13	6

Table of Discounts on Gas Bills at 5, 7½, 10, 12½, 15, *and* 20 *per Cent.*
From 13s. 6½d. to 16s. 4d.

Amount of Gas Bill.	5 per Cent.	7½ per Cent.	10 per Cent.	12½ per Cent.	15 per Cent.	20 per Cent.	Amount of Gas Bill.
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
. 13 6½	. . 8	. 1 0	. 1 4	. 1 8	. 2 0½	. 2 8½	. 13 6½
. 13 7	. . 8	. 1 0	. 1 4	. 1 8½	. 2 0½	. 2 8½	. 13 7
. 13 7½	. . 8	. 1 0	. 1 4½	. 1 8½	. 2 0½	. 2 8½	. 13 7½
. 13 8	. . 8	. 1 0½	. 1 4½	. 1 8½	. 2 0½	. 2 9	. 13 8
. 13 8½	. . 8	. 1 0½	. 1 4½	. 1 8½	. 2 0½	. 2 9	. 13 8½
. 13 9	. . 8	. 1 0½	. 1 4½	. 1 8½	. 2 0½	. 2 9	. 13 9
. 13 9½	. . 8	. 1 0½	. 1 4½	. 1 8½	. 2 0½	. 2 9	. 13 9½
. 13 10	. . 8	. 1 0½	. 1 4½	. 1 8½	. 2 1	. 2 9	. 13 10
. 13 10½	. . 8	. 1 0½	. 1 4½	. 1 8½	. 2 1	. 2 9½	. 13 10½
. 13 11	. . 8	. 1 0½	. 1 4½	. 1 9	. 2 1	. 2 9½	. 13 11
. 13 11½	. . 8½	. 1 0½	. 1 4½	. 1 9	. 2 1	. 2 9½	. 13 11½
. 14 0	. . 8½	. 1 0½	. 1 5	. 1 9	. 2 1	. 2 9½	. 14 0
. 14 0½	. . 8½	. 1 0½	. 1 5	. 1 9	. 2 1	. 2 9½	. 14 0½
. 14 1	. . 8½	. 1 0½	. 1 5	. 1 9	. 2 1	. 2 9½	. 14 1
. 14 1½	. . 8½	. 1 0½	. 1 5	. 1 9	. 2 1½	. 2 10	. 14 1½
. 14 2	. . 8½	. 1 0½	. 1 5	. 1 9	. 2 1½	. 2 10	. 14 2
. 14 2½	. . 8½	. 1 0½	. 1 5	. 1 9	. 2 1½	. 2 10	. 14 2½
. 14 3	. . 8½	. 1 1	. 1 5	. 1 9½	. 2 1½	. 2 10	. 14 3
. 14 3½	. . 8½	. 1 1	. 1 5	. 1 9½	. 2 1½	. 2 10	. 14 3½
. 14 4	. . 8½	. 1 1	. 1 5	. 1 9½	. 2 1½	. 2 10½	. 14 4
. 14 4½	. . 8½	. 1 1	. 1 5	. 1 9½	. 2 1½	. 2 10½	. 14 4½
. 14 5	. . 8½	. 1 1	. 1 5	. 1 9½	. 2 2	. 2 10½	. 14 5
. 14 5½	. . 8½	. 1 1	. 1 5½	. 1 9½	. 2 2	. 2 10½	. 14 5½
. 14 6	. . 8½	. 1 1	. 1 5½	. 1 9½	. 2 2	. 2 11	. 14 6
. 14 6½	. . 8½	. 1 1	. 1 5½	. 1 9½	. 2 2	. 2 11	. 14 6½
. 14 7	. . 8½	. 1 1	. 1 5½	. 1 10	. 2 2	. 2 11	. 14 7
. 14 7½	. . 8½	. 1 1	. 1 5½	. 1 10	. 2 2	. 2 11	. 14 7½
. 14 8	. . 9	. 1 1	. 1 5½	. 1 10	. 2 2	. 2 11	. 14 8
. 14 8½	. . 9	. 1 1	. 1 5½	. 1 10	. 2 2½	. 2 11½	. 14 8½
. 14 9	. . 9	. 1 1	. 1 5½	. 1 10	. 2 2½	. 2 11½	. 14 9
. 14 9½	. . 9	. 1 1½	. 1 5½	. 1 10	. 2 2½	. 2 11½	. 14 9½
. 14 10	. . 9	. 1 1½	. 1 6	. 1 10	. 2 2½	. 2 11½	. 14 10
. 14 10½	. . 9	. 1 1½	. 1 6	. 1 10½	. 2 2½	. 2 11½	. 14 10½
. 14 11	. . 9	. 1 1½	. 1 6	. 1 10½	. 2 3	. 3 0	. 14 11
. 14 11½	. . 9	. 1 1½	. 1 6	. 1 10½	. 2 3	. 3 0	. 14 11½
. 15 0	. . 9	. 1 1½	. 1 6	. 1 10½	. 2 3	. 3 0	. 15 0
. 15 0½	. . 9	. 1 1½	. 1 6	. 1 10½	. 2 3	. 3 0	. 15 0½
. 15 1	. . 9	. 1 1½	. 1 6	. 1 10½	. 2 3	. 3 0	. 15 1
. 15 1½	. . 9	. 1 1½	. 1 6	. 1 10½	. 2 3	. 3 0½	. 15 1½
. 15 2	. . 9	. 1 1½	. 1 6	. 1 10½	. 2 3	. 3 0½	. 15 2
. 15 2½	. . 9	. 1 1½	. 1 6	. 1 11	. 2 3½	. 3 0½	. 15 2½
. 15 3	. . 9	. 1 1½	. 1 6	. 1 11	. 2 3½	. 3 0½	. 15 3
. 15 3½	. . 9	. 1 1½	. 1 6½	. 1 11	. 2 3½	. 3 0½	. 15 3½
. 15 4	. . 9	. 1 2	. 1 6½	. 1 11	. 2 3½	. 3 1	. 15 4
. 15 4½	. . 9	. 1 2	. 1 6½	. 1 11	. 2 3½	. 3 1	. 15 4½
. 15 5	. . 9	. 1 2	. 1 6½	. 1 11	. 2 3½	. 3 1	. 15 5
. 15 5½	. . 9	. 1 2	. 1 6½	. 1 11	. 2 3½	. 3 1	. 15 5½
. 15 6	. . 9	. 1 2	. 1 6½	. 1 11	. 2 4	. 3 1	. 15 6
. 15 6½	. . 9	. 1 2	. 1 6½	. 1 11½	. 2 4	. 3 1½	. 15 6½
. 15 7	. . 9	. 1 2	. 1 6½	. 1 11½	. 2 4	. 3 1½	. 15 7
. 15 7½	. . 9½	. 1 2	. 1 6½	. 1 11½	. 2 4	. 3 1½	. 15 7½
. 15 8	. . 9½	. 1 2	. 1 7	. 1 11½	. 2 4	. 3 1½	. 15 8
. 15 8½	. . 9½	. 1 2	. 1 7	. 1 11½	. 2 4	. 3 1½	. 15 8½
. 15 9	. . 9½	. 1 2	. 1 7	. 1 11½	. 2 4	. 3 2	. 15 9
. 15 9½	. . 9½	. 1 2	. 1 7	. 1 11½	. 2 4½	. 3 2	. 15 9½
. 15 10	. . 9½	. 1 2	. 1 7	. 1 11½	. 2 4½	. 3 2	. 15 10
. 15 10½	. . 9½	. 1 2½	. 1 7	. 2 0	. 2 4½	. 3 2	. 15 10½
. 15 11	. . 9½	. 1 2½	. 1 7	. 2 0	. 2 4½	. 3 2	. 15 11
. 15 11½	. . 9½	. 1 2½	. 1 7	. 2 0	. 2 4½	. 3 2½	. 15 11½
. 16 0	. . 9½	. 1 2½	. 1 7	. 2 0	. 2 5	. 3 2½	. 16 0
. 16 0½	. . 9½	. 1 2½	. 1 7	. 2 0	. 2 5	. 3 2½	. 16 0½
. 16 1	. . 9½	. 1 2½	. 1 7	. 2 0	. 2 5	. 3 2½	. 16 1
. 16 1½	. . 9½	. 1 2½	. 1 7½	. 2 0	. 2 5	. 3 2½	. 16 1½
. 16 2	. . 9½	. 1 2½	. 1 7½	. 2 0	. 2 5	. 3 3	. 16 2
. 16 2½	. . 9½	. 1 2½	. 1 7½	. 2 0	. 2 5	. 3 3	. 16 2½
. 16 3	. . 9½	. 1 2½	. 1 7½	. 2 0½	. 2 5	. 3 3	. 16 3
. 16 3½	. . 9½	. 1 2½	. 1 7½	. 2 0½	. 2 5½	. 3 3	. 16 3½
. 16 4	. . 10	. 1 2½	. 1 7½	. 2 0½	. 2 5½	. 3 3	. 16 4

Table of Discounts on Gas Bills at 5, 7½, 10, 12½, 15, and 20 per Cent.

From 16s. 4½d. to 19s. 2d.

Amount of Gas Bill.	5 per Cent.	7½ per Cent.	10 per Cent.	12½ per Cent.	15 per Cent.	20 per Cent.	Amount of Gas Bill.
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
. 16 4½	. . 10	. 1 2½	. 1 7½	. 2 0½	. 2 5½	. 3 3½	. 16 4½
. 16 5	. . 10	. 1 3	. 1 7½	. 2 0½	. 2 5½	. 3 3½	. 16 5
. 16 5½	. . 10	. 1 3	. 1 7½	. 2 0½	. 2 5½	. 3 3½	. 16 5½
. 16 6	. . 10	. 1 3	. 1 8	. 2 0½	. 2 5½	. 3 3½	. 16 6
. 16 6½	. . 10	. 1 3	. 1 8	. 2 0½	. 2 5½	. 3 3½	. 16 6½
. 16 7	. . 10	. 1 3	. 1 8	. 2 1	. 2 6	. 3 4	. 16 7
. 16 7½	. . 10	. 1 3	. 1 8	. 2 1	. 2 6	. 3 4	. 16 7½
. 16 8	. . 10	. 1 3	. 1 8	. 2 1	. 2 6	. 3 4	. 16 8
. 16 8½	. . 10	. 1 3	. 1 8	. 2 1	. 2 6	. 3 4	. 16 8½
. 16 9	. . 10	. 1 3	. 1 8	. 2 1	. 2 6	. 3 4	. 16 9
. 16 9½	. . 10	. 1 3	. 1 8	. 2 1	. 2 6	. 3 4½	. 16 9½
. 16 10	. . 10	. 1 3	. 1 8	. 2 1	. 2 6	. 3 4½	. 16 10
. 16 10½	. . 10	. 1 3	. 1 8	. 2 1	. 2 6½	. 3 4½	. 16 10½
. 16 11	. . 10	. 1 3	. 1 8	. 2 1½	. 2 6½	. 3 4½	. 16 11
. 16 11½	. . 10	. 1 3	. 1 8½	. 2 1½	. 2 6½	. 3 4½	. 16 11½
. 17 0	. . 10	. 1 3	. 1 8½	. 2 1½	. 2 6½	. 3 5	. 17 0
. 17 0½	. . 10	. 1 3½	. 1 8½	. 2 1½	. 2 6½	. 3 5	. 17 0½
. 17 1	. . 10	. 1 3½	. 1 8½	. 2 1½	. 2 6½	. 3 5	. 17 1
. 17 1½	. . 10	. 1 3½	. 1 8½	. 2 1½	. 2 6½	. 3 5	. 17 1½
. 17 2	. . 10½	. 1 3½	. 1 8½	. 2 1½	. 2 7	. 3 5	. 17 2
. 17 2½	. . 10½	. 1 3½	. 1 8½	. 2 1½	. 2 7	. 3 5½	. 17 2½
. 17 3	. . 10½	. 1 3½	. 1 8½	. 2 2	. 2 7	. 3 5½	. 17 3
. 17 3½	. . 10½	. 1 3½	. 1 8½	. 2 2	. 2 7	. 3 5½	. 17 3½
. 17 4	. . 10½	. 1 3½	. 1 8½	. 2 2	. 2 7	. 3 5½	. 17 4
. 17 4½	. . 10½	. 1 3½	. 1 8½	. 2 2	. 2 7	. 3 5½	. 17 4½
. 17 5	. . 10½	. 1 3½	. 1 9	. 2 2	. 2 7½	. 3 6	. 17 5
. 17 5½	. . 10½	. 1 3½	. 1 9	. 2 2	. 2 7½	. 3 6	. 17 5½
. 17 6	. . 10½	. 1 3½	. 1 9	. 2 2	. 2 7½	. 3 6	. 17 6
. 17 6½	. . 10½	. 1 3½	. 1 9	. 2 2½	. 2 7½	. 3 6	. 17 6½
. 17 7	. . 10½	. 1 4	. 1 9	. 2 2½	. 2 7½	. 3 6	. 17 7
. 17 7½	. . 10½	. 1 4	. 1 9	. 2 2½	. 2 7½	. 3 6½	. 17 7½
. 17 8	. . 10½	. 1 4	. 1 9	. 2 2½	. 2 8	. 3 6½	. 17 8
. 17 8½	. . 10½	. 1 4	. 1 9	. 2 2½	. 2 8	. 3 6½	. 17 8½
. 17 9	. . 10½	. 1 4	. 1 9	. 2 2½	. 2 8	. 3 6½	. 17 9
. 17 9½	. . 10½	. 1 4	. 1 9½	. 2 2½	. 2 8	. 3 6½	. 17 9½
. 17 10	. . 10½	. 1 4	. 1 9½	. 2 3	. 2 8	. 3 7	. 17 10
. 17 10½	. . 10½	. 1 4	. 1 9½	. 2 3	. 2 8	. 3 7	. 17 10½
. 17 11	. . 10½	. 1 4	. 1 9½	. 2 3	. 2 8	. 3 7	. 17 11
. 17 11½	. . 10½	. 1 4	. 1 9½	. 2 3	. 2 8½	. 3 7	. 17 11½
. 18 0	. . 11	. 1 4	. 1 9½	. 2 3	. 2 8½	. 3 7	. 18 0
. 18 0½	. . 11	. 1 4	. 1 9½	. 2 3	. 2 8½	. 3 7½	. 18 0½
. 18 1	. . 11	. 1 4	. 1 9½	. 2 3	. 2 8½	. 3 7½	. 18 1
. 18 1½	. . 11	. 1 4½	. 1 9½	. 2 3½	. 2 8½	. 3 7½	. 18 1½
. 18 2	. . 11	. 1 4½	. 1 10	. 2 3½	. 2 8½	. 3 7½	. 18 2
. 18 2½	. . 11	. 1 4½	. 1 10	. 2 3½	. 2 8½	. 3 7½	. 18 2½
. 18 3	. . 11	. 1 4½	. 1 10	. 2 3½	. 2 9	. 3 8	. 18 3
. 18 3½	. . 11	. 1 4½	. 1 10	. 2 3½	. 2 9	. 3 8	. 18 3½
. 18 4	. . 11	. 1 4½	. 1 10	. 2 3½	. 2 9	. 3 8	. 18 4
. 18 4½	. . 11	. 1 4½	. 1 10	. 2 3½	. 2 9	. 3 8	. 18 4½
. 18 5	. . 11	. 1 4½	. 1 10	. 2 4	. 2 9	. 3 8	. 18 5
. 18 5½	. . 11	. 1 4½	. 1 10	. 2 4	. 2 9	. 3 8½	. 18 5½
. 18 6	. . 11	. 1 4½	. 1 10	. 2 4	. 2 9	. 3 8½	. 18 6
. 18 6½	. . 11	. 1 4½	. 1 10	. 2 4	. 2 9½	. 3 8½	. 18 6½
. 18 7	. . 11	. 1 4½	. 1 10	. 2 4	. 2 9½	. 3 8½	. 18 7
. 18 7½	. . 11	. 1 4½	. 1 10½	. 2 4	. 2 9½	. 3 8½	. 18 7½
. 18 8	. . 11	. 1 5	. 1 10½	. 2 4	. 2 9½	. 3 9	. 18 8
. 18 8½	. . 11	. 1 5	. 1 10½	. 2 4½	. 2 9½	. 3 9	. 18 8½
. 18 9	. . 11	. 1 5	. 1 10½	. 2 4½	. 2 9½	. 3 9	. 18 9
. 18 9½	. . 11½	. 1 5	. 1 10½	. 2 4½	. 2 9½	. 3 9	. 18 9½
. 18 10	. . 11½	. 1 5	. 1 10½	. 2 4½	. 2 10	. 3 9	. 18 10
. 18 10½	. . 11½	. 1 5	. 1 10½	. 2 4½	. 2 10	. 3 9½	. 18 10½
. 18 11	. . 11½	. 1 5	. 1 10½	. 2 4½	. 2 10	. 3 9½	. 18 11
. 18 11½	. . 11½	. 1 5	. 1 10½	. 2 4½	. 2 10	. 3 9½	. 18 11½
. 19 0	. . 11½	. 1 5	. 1 11	. 2 4½	. 2 10	. 3 9½	. 19 0
. 19 0½	. . 11½	. 1 5	. 1 11	. 2 4½	. 2 10	. 3 9½	. 19 0½
. 19 1	. . 11½	. 1 5	. 1 11	. 2 5	. 2 10	. 3 10	. 19 1
. 19 1½	. . 11½	. 1 5	. 1 11	. 2 5	. 2 10½	. 3 10	. 19 1½
. 19 2	. . 11½	. 1 5	. 1 11	. 2 5	. 2 10½	. 3 10	. 19 2

Table of Discounts on Gas Bills at 5, 7½, 10, 12½, 15, and 20 per Cent.

From 19s. 2½d. to £49.

Amount of Gas Bill.	5 per Cent.	7½ per Cent.	10 per Cent.	12½ per Cent.	15 per Cent.	20 per Cent.	Amount of Gas Bill.
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
. 19 2½	. - . 11½	. 1 5½	. 1 11	. 2 5	. 2 10½	. 3 10	. 19 2½
. 19 3	. . 11½	. 1 5½	. 1 11	. 2 5	. 2 10½	. 3 10	. 19 3
. 19 3½	. . 11½	. 1 5½	. 1 11	. 2 5	. 2 10½	. 3 10½	. 19 3½
. 19 4	. . 11¼	. 1 5½	. 1 11	. 2 5	. 2 10½	. 3 10½	. 19 4
. 19 4½	. . 11½	. 1 5¼	. 1 11	. 2 5	. 2 10½	. 3 10½	. 19 4½
. 19 5	. . 11½	. 1 5½	. 1 11	. 2 5	. 2 11	. 3 10½	. 19 5
. 19 5½	. . 11½	. 1 5½	. 1 11½	. 2 5	. 2 11	. 3 10½	. 19 5½
. 19 6	. . 11½	. 1 5¼	. 1 11½	. 2 5	. 2 11	. 3 11	. 19 6
. 19 6½	. . 11½	. 1 5½	. 1 11½	. 2 5½	. 2 11	. 3 11	. 19 6½
. 19 7	. . 11½	. 1 5½	. 1 11½	. 2 5½	. 2 11	. 3 11	. 19 7
. 19 7½	. . 11¼	. 1 5¼	. 1 11½	. 2 5½	. 2 11	. 3 11	. 19 7½
. 19 8	. 1 0	. 1 5½	. 1 11½	. 2 5½	. 2 11	. 3 11	. 19 8
. 19 8½	. 1 0	. 1 5½	. 1 11½	. 2 5½	. 2 11½	. 3 11½	. 19 8½
. 19 9	. 1 0	. 1 5½	. 1 11½	. 2 5½	. 2 11½	. 3 11½	. 19 9
. 19 9½	. 1 0	. 1 5½	. 1 11¼	. 2 5¼	. 2 11½	. 3 11¼	. 19 9½
. 19 10	. 1 0	. 1 6	. 2 0	. 2 5½	. 2 11½	. 3 11½	. 19 10
. 19 10½	. 1 0	. 1 6	. 2 0	. 2 6	. 2 11¼	. 3 11¼	. 19 10½
. 19 11	. 1 0	. 1 6	. 2 0	. 2 6	. 2 11¼	. 4 0	. 19 11
. 19 11½	. 1 0	. 1 6	. 2 0	. 2 6	. 3 0	. 4 0	. 19 11½
1 0 0	. 1 0	. 1 6	. 2 0	. 2 6	. 3 0	. 4 0	1 0 0
2 0 0	. 2 0	. 3 0	. 4 0	. 5 0	. 6 0	. 8 0	2 0 0
3 0 0	. 3 0	. 4 6	. 6 0	. 7 6	. 9 0	. 12 0	3 0 0
4 0 0	. 4 0	. 6 0	. 8 0	. 10 0	. 12 0	. 16 0	4 0 0
5 0 0	. 5 0	. 7 6	. 10 0	. 12 6	. 15 0	1 0 0	5 0 0
6 0 0	. 6 0	. 9 0	. 12 0	. 15 0	. 18 0	1 4 0	6 0 0
7 0 0	. 7 0	. 10 6	. 14 0	. 17 6	1 1 0	1 8 0	7 0 0
8 0 0	. 8 0	. 12 0	. 16 0	1 0 0	1 4 0	1 12 0	8 0 0
9 0 0	. 9 0	. 13 6	. 18 0	1 2 6	1 7 0	1 16 0	9 0 0
10 0 0	. 10 0	. 15 0	1 0 0	1 5 0	1 10 0	2 0 0	10 0 0
11 0 0	. 11 0	. 16 6	1 2 0	1 7 6	1 13 0	2 4 0	11 0 0
12 0 0	. 12 0	. 18 0	1 4 0	1 10 0	1 16 0	2 8 0	12 0 0
13 0 0	. 13 0	. 19 6	1 6 0	1 12 6	1 19 0	2 12 0	13 0 0
14 0 0	. 14 0	1 1 0	1 8 0	1 15 0	2 2 0	2 16 0	14 0 0
15 0 0	. 15 0	1 2 6	1 10 0	1 17 6	2 5 0	3 0 0	15 0 0
16 0 0	. 16 0	1 4 0	1 12 0	2 0 0	2 8 0	3 4 0	16 0 0
17 0 0	. 17 0	1 5 6	1 14 0	2 2 6	2 11 0	3 8 0	17 0 0
18 0 0	. 18 0	1 7 0	1 16 0	2 5 0	2 14 0	3 12 0	18 0 0
19 0 0	. 19 0	1 8 6	1 18 0	2 7 6	2 17 0	3 16 0	19 0 0
20 0 0	1 0 0	1 10 0	2 0 0	2 10 0	3 0 0	4 0 0	20 0 0
21 0 0	1 1 0	1 11 6	2 2 0	2 12 6	3 3 0	4 4 0	21 0 0
22 0 0	1 2 0	1 13 0	2 4 0	2 15 0	3 6 0	4 8 0	22 0 0
23 0 0	1 3 0	1 14 6	2 6 0	2 17 6	3 9 0	4 12 0	23 0 0
24 0 0	1 4 0	1 16 0	2 8 0	3 0 0	3 12 0	4 16 0	24 0 0
25 0 0	1 5 0	1 17 6	2 10 0	3 2 6	3 15 0	5 0 0	25 0 0
26 0 0	1 6 0	1 19 0	2 12 0	3 5 0	3 18 0	5 4 0	26 0 0
27 0 0	1 7 0	2 0 6	2 14 0	3 7 6	4 1 0	5 8 0	27 0 0
28 0 0	1 8 0	2 2 0	2 16 0	3 10 0	4 4 0	5 12 0	28 0 0
29 0 0	1 9 0	2 3 6	2 18 0	3 12 6	4 7 0	5 16 0	29 0 0
30 0 0	1 10 0	2 5 0	3 0 0	3 15 0	4 10 0	6 0 0	30 0 0
31 0 0	1 11 0	2 6 6	3 2 0	3 17 6	4 13 0	6 4 0	31 0 0
32 0 0	1 12 0	2 8 0	3 4 0	4 0 0	4 16 0	6 8 0	32 0 0
33 0 0	1 13 0	2 9 6	3 6 0	4 2 6	4 19 0	6 12 0	33 0 0
34 0 0	1 14 0	2 11 0	3 8 0	4 5 0	5 2 0	6 16 0	34 0 0
35 0 0	1 15 0	2 12 6	3 10 0	4 7 6	5 5 0	7 0 0	35 0 0
36 0 0	1 16 0	2 14 0	3 12 0	4 10 0	5 8 0	7 4 0	36 0 0
37 0 0	1 17 0	2 15 6	3 14 0	4 12 6	5 11 0	7 8 0	37 0 0
38 0 0	1 18 0	2 17 0	3 16 0	4 15 0	5 14 0	7 12 0	38 0 0
39 0 0	1 19 0	2 18 6	3 18 0	4 17 6	5 17 0	7 16 0	39 0 0
40 0 0	2 0 0	3 0 0	4 0 0	5 0 0	6 0 0	8 0 0	40 0 0
41 0 0	2 1 0	3 1 6	4 2 0	5 2 6	6 3 0	8 4 0	41 0 0
42 0 0	2 2 0	3 3 0	4 4 0	5 5 0	6 6 0	8 8 0	42 0 0
43 0 0	2 3 0	3 4 6	4 6 0	5 7 6	6 9 0	8 12 0	43 0 0
44 0 0	2 4 0	3 6 0	4 8 0	5 10 0	6 12 0	8 16 0	44 0 0
45 0 0	2 5 0	3 7 6	4 10 0	5 12 6	6 15 0	9 0 0	45 0 0
46 0 0	2 6 0	3 9 0	4 12 0	5 15 0	6 18 0	9 4 0	46 0 0
47 0 0	2 7 0	3 10 6	4 14 0	5 17 6	7 1 0	9 8 0	47 0 0
48 0 0	2 8 0	3 12 0	4 16 0	6 0 0	7 4 0	9 12 0	48 0 0
49 0 0	2 9 0	3 13 6	4 18 0	6 2 6	7 7 0	9 16 0	49 0 0

Table of Discounts on Gas Bills at 5, 7½, 10, 12½, 15, and 20 per Cent.
From £50 to £100.

Amount of Gas Bill.			5 per Cent.			7½ per Cent.			10 per Cent.			12½ per Cent.			15 per Cent.			20 per Cent.			Amount of Gas Bill.		
£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
50	0	0	2	10	0	3	15	0	5	0	0	6	5	0	7	10	0	10	0	0	50	0	0
51	0	0	2	11	0	3	16	6	5	2	0	6	7	6	7	13	0	10	4	0	51	0	0
52	0	0	2	12	0	3	18	0	5	4	0	6	10	0	7	16	0	10	8	0	52	0	0
53	0	0	2	13	0	3	19	6	5	6	0	6	12	6	7	19	0	10	12	0	53	0	0
54	0	0	2	14	0	4	1	0	5	8	0	6	15	0	8	2	0	10	16	0	54	0	0
55	0	0	2	15	0	4	2	6	5	10	0	6	17	6	8	5	0	11	0	0	55	0	0
56	0	0	2	16	0	4	4	0	5	12	0	7	0	0	8	8	0	11	4	0	56	0	0
57	0	0	2	17	0	4	5	6	5	14	0	7	2	6	8	11	0	11	8	0	57	0	0
58	0	0	2	18	0	4	7	0	5	16	0	7	5	0	8	14	0	11	12	0	58	0	0
59	0	0	2	19	0	4	8	6	5	18	0	7	7	6	8	17	0	11	16	0	59	0	0
60	0	0	3	0	0	4	10	0	6	0	0	7	10	0	9	0	0	12	0	0	60	0	0
61	0	0	3	1	0	4	11	6	6	2	0	7	12	6	9	3	0	12	4	0	61	0	0
62	0	0	3	2	0	4	13	0	6	4	0	7	15	0	9	6	0	12	8	0	62	0	0
63	0	0	3	3	0	4	14	6	6	6	0	7	17	6	9	9	0	12	12	0	63	0	0
64	0	0	3	4	0	4	16	0	6	8	0	8	0	0	9	12	0	12	16	0	64	0	0
65	0	0	3	5	0	4	17	6	6	10	0	8	2	6	9	15	0	13	0	0	65	0	0
66	0	0	3	6	0	4	19	0	6	12	0	8	5	0	9	18	0	13	4	0	66	0	0
67	0	0	3	7	0	5	0	6	6	14	0	8	7	6	10	1	0	13	8	0	67	0	0
68	0	0	3	8	0	5	2	0	6	16	0	8	10	0	10	4	0	13	12	0	68	0	0
69	0	0	3	9	0	5	3	6	6	18	0	8	12	6	10	7	0	13	16	0	69	0	0
70	0	0	3	10	0	5	5	0	7	0	0	8	15	0	10	10	0	14	0	0	70	0	0
71	0	0	3	11	0	5	6	6	7	2	0	8	17	6	10	13	0	14	4	0	71	0	0
72	0	0	3	12	0	5	8	0	7	4	0	9	0	0	10	16	0	14	8	0	72	0	0
73	0	0	3	13	0	5	9	6	7	6	0	9	2	6	10	19	0	14	12	0	73	0	0
74	0	0	3	14	0	5	11	0	7	8	0	9	5	0	11	2	0	14	16	0	74	0	0
75	0	0	3	15	0	5	12	6	7	10	0	9	7	6	11	5	0	15	0	0	75	0	0
76	0	0	3	16	0	5	14	0	7	12	0	9	10	0	11	8	0	15	4	0	76	0	0
77	0	0	3	17	0	5	15	6	7	14	0	9	12	6	11	11	0	15	8	0	77	0	0
78	0	0	3	18	0	5	17	0	7	16	0	9	15	0	11	14	0	15	12	0	78	0	0
79	0	0	3	19	0	5	18	6	7	18	0	9	17	6	11	17	0	15	16	0	79	0	0
80	0	0	4	0	0	6	0	0	8	0	0	10	0	0	12	0	0	16	0	0	80	0	0
81	0	0	4	1	0	6	1	6	8	2	0	10	2	6	12	3	0	16	4	0	81	0	0
82	0	0	4	2	0	6	3	0	8	4	0	10	5	0	12	6	0	16	8	0	82	0	0
83	0	0	4	3	0	6	4	6	8	6	0	10	7	6	12	9	0	16	12	0	83	0	0
84	0	0	4	4	0	6	6	0	8	8	0	10	10	0	12	12	0	16	16	0	84	0	0
85	0	0	4	5	0	6	7	6	8	10	0	10	12	6	12	15	0	17	0	0	85	0	0
86	0	0	4	6	0	6	9	0	8	12	0	10	15	0	12	18	0	17	4	0	86	0	0
87	0	0	4	7	0	6	10	6	8	14	0	10	17	6	13	1	0	17	8	0	87	0	0
88	0	0	4	8	0	6	12	0	8	16	0	11	0	0	13	4	0	17	12	0	88	0	0
89	0	0	4	9	0	6	13	6	8	18	0	11	2	6	13	7	0	17	16	0	89	0	0
90	0	0	4	10	0	6	15	0	9	0	0	11	5	0	13	10	0	18	0	0	90	0	0
91	0	0	4	11	0	6	16	6	9	2	0	11	7	6	13	13	0	18	4	0	91	0	0
92	0	0	4	12	0	6	18	0	9	4	0	11	10	0	13	16	0	18	8	0	92	0	0
93	0	0	4	13	0	6	19	6	9	6	0	11	12	6	13	19	0	18	12	0	93	0	0
94	0	0	4	14	0	7	1	0	9	8	0	11	15	0	14	2	0	18	16	0	94	0	0
95	0	0	4	15	0	7	2	6	9	10	0	11	17	6	14	5	0	19	0	0	95	0	0
96	0	0	4	16	0	7	4	0	9	12	0	12	0	0	14	8	0	19	4	0	96	0	0
97	0	0	4	17	0	7	5	6	9	14	0	12	2	6	14	11	0	19	8	0	97	0	0
98	0	0	4	18	0	7	7	0	9	16	0	12	5	0	14	14	0	19	12	0	98	0	0
99	0	0	4	19	0	7	8	6	9	18	0	12	7	6	14	17	0	19	16	0	99	0	0
100	0	0	5	0	0	7	10	0	10	0	0	12	10	0	15	0	0	20	0	0	100	0	0

WATER:

Its Weight and Measure at the Common Temperature.

1 pint = 34·65 cubic inches, or 1·25 lbs.
1 gal. = 277·274 cubic inches, or 10 lbs.
11·2 gals. = 1 cwt.
224 gals. = 1 ton.
1 cubic inch = 252·45 grs., or ·03617 lbs.
12 „ inches = ·434 lbs.
1 „ foot = 6·25 gals., or 1000 ozs., or 62·5 lbs.
1·8 „ „ = 1 cwt.
35·84 cubic feet = 1 ton.
1 cylindrical inch = ·02842 lbs.
12 „ inches = ·341 lbs.
1 „ foot = 5 gals., or 49·1 lbs.
2·282 „ feet = 1 cwt.
45·64 „ „ = 1 ton.

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1 cubic inch of mercury = 3425·25 grs.

WEIGHTS AND MEASURES.

Troy Weight.

Pound.		Ounces.		Pennyweights.		Grains.	gr.
				1	=	24	dwt.
		1	=	20	=	480	oz.
1	=	12	=	240	=	5760	lb.

A carat = 4 grains.
437·5 grs. troy = 1 oz. avoirdupois.
7000 „ = 1 lb. „
100 ozs. troy = 109$\frac{5}{7}$ ozs. avoirdupois.
3·2 grs. troy = 4 diamond grs.
1 oz. „ = 150 „

Troy weight is used in philosophical experiments, and in weighing gold, silver, and jewels. The fineness of gold and silver coins means the proportion of the precious metal which they contain; this is expressed in 1000ths of their total weight, or in carats—24ths of their total weight. British gold coins are 22 carats fine, or 0·916$\frac{2}{3}$; silver coins 0·925. Gold, if pure, is said to be 24 carats fine; if there be one of alloy, with 23 carats of pure gold, it is 23 carats fine, and so on downwards. The alloy in gold and silver coins consists of copper. The true weight of a sovereign is 123·274 grs., consisting of—pure gold, 11 parts, or 113·001 grs.; copper, 1 part, or 10·273 grs.

Apothecaries' Weight.

Pound.		Ounces.		Drams, or Drachms.		Scruples.		Grains.	gr.
						1	=	20	scr.
				1	=	3	=	60	dr.
		1	=	8	=	24	=	480	oz.
1	=	12	=	96	=	288	=	5760	lb.

The sign of the scruple is ℈; the dram, ʒ; the ounce, ℥.

This weight is used only for *compounding* medicines; drugs are bought and sold by avoirdupois. The grain, ounce, and pound are equal to those of troy weight.

Avoirdupois Weight.

Ton.	Hundwts.	Quarters.	Stones.	Pounds.	Ounces.	Drams. dr.
					1	16 oz.
				1	16	256 lb.
			1	14	224	3584 st.
		1	2	28	448	7168 qr.
	1	4	8	112	1792	28672 cwt.
1	20	80	160	2240	35840	573440 ton.

100 ozs. avoirdupois = 91 7-48ths ozs. troy.

The imperial pound avoirdupois is the standard unit by means of which all commodities, except gold, silver, and precious stones, are weighed, and is equal to the weight of one-tenth of an imperial gallon, or of 27·7274 cubic inches of distilled water at the temperature of 62° Fahr., and when the barometer stands at 30 inches. A certain piece of platinum of this standard weight is kept in the Exchequer Office, at Westminster.

Lineal or Long Measure.

Mile.	Furlongs.	Chains.	Rods, Perches, or Poles.	Yards.	Feet.	Inches.
					1	12
				1	3	36
			1	5½	16½	198
		1	4	22	66	792
	1	10	40	220	660	7920
1	8	80	320	1760	5280	63360

1 link = 7·92 inches.
100 links = 1 chain.
1 league = 3 nautical miles.
1 hand = 4 inches.
1 fathom = 6 feet.
1 military pace = 2½ feet.
1 geometrical pace = 5 feet.
1 geographical or nautical mile = 1·15 statute miles.
1 geographical degree = 60 geographical or nautical miles.
1 Admiralty knot = 6080 feet.

The yard is the imperial standard measure of length, and is the distance, at the temperature of 62° Fahr., between two marks on a certain bar kept in the Exchequer Office, Westminster.

Cloth Measure.

Ell.	Yard.	Quarters.	Nails.	Inches.
			1	2¼
		1	4	9
	1	4	16	36
1	1¼	5	20	45

The yard is the same as in Long Measure, but differs in its divisions and subdivisions.

Yarn Measure—Cotton.

Spindle.	Hanks.	Skeins.	Yards.
		1	120
	1	7	840
1	18	126	15120

Yarn Measure—Linen.

Spindle.	Hasps.	Hears.	Cuts.	Yards.
			1	300
		1	2	600
	1	6	12	3600
1	4	24	48	14400

Square Measure.

Acre.	Sq. Roods.	Sq. Poles or Perches.	Sq. Yards.	Sq. Feet.	Sq. Inches.
				1	144
			1	9	1296
		1	30¼	272¼	39204
	1	40	1210	10890	1568160
1	4	160	4840	43560	6272640

1 square mile = 640 acres.

Square Measure—Land.

Acre	Sq. Roods.	Sq. Chains.	Sq. Perch.	Sq Links.
			1	625
		1	..	10000
	1	2·5	..	25000
1	4	10	..	100000

The chain with which land is measured is 22 yards long.

Solid or Cubic Measure.

Cubic Yard.	Cubic Feet.	Cubic Inches.
	1	1728
1	27	46656

Liquid Measure.

Gallon.	Quarts.	Pints.	Gills.
		1	4
	1	2	8
1	4	8	32

The standard measure of capacity, both for liquids and dry goods, is the imperial gallon, being equal to a volume of distilled water of 277·274 cubic inches, weighing 10 lbs. avoirdupois, at the temperature of 62° Fahr., and 30 inches atmospheric pressure.

Liquid Measure used by Apothecaries.

1 fluid minim = 0·0045 cubic inches. (♏)
60 „ „ = 1 dram. (ʒ)
8 drams = 1 oz. (℥)
16 oz. = 1 pint. (⊙)

The pint is the same as the ordinary pint measure.

Wine Measure.

Tun.	Pipes.	Puncheons.	Hogsheads.	Tierces.	Gallons.	Quarts.	Pints.
						1	2
					1	4	8
				1	42	168	336
			1	1½	63	257	504
		1	1⅓	2	84	336	672
	1	1½	2	3	126	504	1008
1	2	3	4	6	252	1008	2016

Ale and Beer Measures.

Butt.	Puncheons.	Hogsheads.	Barrels.	Kilderkins.	Firkins.	Gallons.	Quarts.	Pints.
							1	2
						1	4	8
					1	9	36	72
				1	2	18	72	144
			1	2	4	36	144	288
		1	1½	3	6	54	216	432
	1	1⅓	2	4	8	72	288	576
1	1½	2	3	6	12	108	432	864

Dry Measure.

										Gallons.		Pints.
								Pecks		1	=	8
						Bushels.		1	=	2	=	16
				Quarters.		1	=	4	=	8	=	64
		Loads or Weys.		1	=	8	=	32	=	64	=	512
Last.		1	=	5	=	40	=	160	=	320	=	2560
1	=	2	=	10	=	80	=	320	=	640	=	5120

3 bushels = 1 sack = $4\frac{8}{9}$ cubic feet (nearly).
12 sacks = 1 chaldron = 58⅔ cubic feet (nearly).

The imperial bushel contains 80 lbs. avoirdupois of distilled water, and its content is 2218·192 cubic inches.

Table of Time.

						Minutes.		Seconds.
				Hours.		1	=	60
		Days.		1	=	60	=	3600
Week.		1	=	24	=	1440	=	86400
1	=	7	=	168	=	10080	=	604800

28 days = 1 lunar month.
28, 29, 30, or 31 days = 1 calendar month.
1 common year = 365 days, or 52 weeks 1 day.
1 leap year = 366 days, or 52 weeks 2 days.
1 solar year = 365 days 48 minutes 49 seconds.

SIZES OF DRAWING-PAPER.

	Ft.	In.		Ft.	In.		Ft.	In.		Ft	In.
Antiquarian . . .	4	4	×	2	7	Double crown . .	3	6	×	1	8
,, extra .	4	8	×	3	4	Imperial	2	6	×	1	9
Double elephant .	3	4	×	2	2	Super royal . . .	2	3	×	1	7
Atlas	2	9	×	2	2	Royal	2	0	×	1	7
Columbia	2	10	×	1	11	Medium	1	10	×	1	5
Elephant	2	3¾	×	1	10¼	Demy	1	8	×	1	3

FRENCH WEIGHTS AND MEASURES.

Decimal System.

Weights.

French.	English.
Milligramme	0·0154 grs.
Centigramme	0·1543 ,,
Décigramme	1·5434 ,,
Gramme	15·434 ,,
Décagramme	154·34 ,,
Hectogramme	3·527 ozs. avoirdupois.
Kilogramme	2·2048 lbs. ,,
Myriagramme	22·048 ,, ,,
Quintal	1 cwt. 3 qrs. 24½ lbs.
Millier, or bar	9 tons 16 cwt. 3 qrs. 12 lbs.
Gramme	·0022 lb. avoirdupois.
Kilogramme	·01969 cwt.

·4535 kilogrammes	1 lb. avoirdupois.
50·787 ,,	1 cwt.
1015·965 ,,	1 ton.
1·015965 tonne	1 ton.
1 tonne	1 ton × 0·984.

Long Measure.

French.	English.
Millimètre	0·0393 inches.
Centimètre	0·3937 ,,
Décimètre	3·9371 ,,
Mètre	39·371 ,, 3·2809 feet. 1·0936 yards.
Décamètre	32·809 feet.
Hectomètre	328·09 ,,
Kilomètre	1093·639 yards.
Myriamètre	6·2138 miles.
·0254 mètres	1 inch.
·30479 ,,	1 foot.
20·116 ,,	1 chain.
1609·31 ,,	1 mile.

Square Measure.

French.	English.
Milliare	155·00 square inches. 1·0764 ,, feet. ·1196 ,, yards.
Centiare, or sq. mètre	10·764 ,, feet.
Déciare	11·960 ,, yards.
Are, or sq. décamètre	119·60 ,, ,,
Décare	1196·046 ,, ,,
Hectare	2·4712 ,, acres.

Solid Measure.

French.	English.
Millistère	61·028 cubic inches. ·035317 ,, feet.
Centistère	610·28 ,, inches.
Décistère	3·5317 ,, feet.
Stere, or cubic mètre	35·317 ,, ,,
Décastère	13·080 ,, yards.
Hectostère	130·80 ,, ,,

Dry and Fluid Measure. (Capacity.)

French.	English.
Millilitre	0·0610 cubic inches.
Centilitre	0·6103 ,,
Décilitre	6·1028 ,,
Litre, or cubic décimètre	61·028 ,,
,,	1·761 imperial pints.
Décalitre	610·28 cubic inches.
,,	2·2 imperial gallons.
Hectolitre	3·5371 cubic feet.
,,	2·75 imperial bushels.
Kilolitre	35·317 cubic feet.
Myrialitre	353·171 ,,
Litre × 4·543	gallons.
Litre × 0·0163	cubic inches.

MISCELLANEOUS ARTICLES.

Bale of flax (Russia)	5 to 6 cwt.
Barrel of tar	26¼ gallons.
Cable's length	240 yards.
Cask of black lead	11½ cwt.
Chaldron of coal	25½ „
„ coke	12½ to 15 cwt.
Cord of wood	128 cubic feet.
Dozen	12 articles.
Faggot of steel	120 lbs.
Fodder of lead	19½ cwt.
Gross	12 dozen.
Hundred of deals	120 in number.
„ nails	120 „
Keel of coals, 21 tons 4 cwt., or 8 chaldrons.	
Load of bricks	500 bricks.
„ inch boards	600 square feet.
„ lime	32 bushels.
„ old hay	18 cwt.
„ new hay	19 „ 32 lbs.
„ straw	11 cwt. 64 „
„ sand	36 bushels.
„ squared timber	50 cubic feet.
„ unhewn „	40 „
„ tiles	1000 tiles.
„ 2-inch planks	300 square feet.
Mat of flax (Dutch)	126 lbs.
Pig of ballast	56 lbs.
Quire of paper	24 sheets.
Ream of paper	20 quires, or 480 sheets.
Roll of parchment	60 skins.
Sack of coals	224 lbs.
Score	20 articles.
Sheet of paper folded into—	
2 leaves is termed	folio size.
4 „ „	4to, or quarto.
8 „ „	8vo, or octavo.
12 „ „	12mo, or duodecimo.
16 „ „	16mo.
18 „ „	18mo.
24 „ „	24mo.
48 „ „	48mo.
Thousand of nails	1200 nails.
Truss of old hay	56 lbs.
„ new hay	60 „
„ straw	36 „

CHRONOLOGY OF GAS LIGHTING.

1659.—February. Mr. Thomas Shirley communicated to the Royal Society some experiments on the gas issuing from a well near Wigan.

1667.—June. The paper of Mr. Shirley, referred to above, appeared in the "Philosophical Transactions." He shows that it was not the water which burnt, as was generally supposed, but the gas issuing from it, and this gas he believed to proceed from one of the coal-pits in the neighbourhood.

1726.—Dr. Stephen Hales, in the first volume of his "Vegetable Statics," records some experiments on the distillation of coal, from which he obtained an "elastic inflammable air."

1733.—In the Royal Society's "Transactions" is a communication from Sir James Lowther on the inflammable air issuing from the shaft of a coal-mine near Whitehaven. When lighted, the flame was 3 feet in diameter, and about 9 feet high. The gas, being conveyed through a tube to the surface, continued to escape in undiminished strength for several years.

1739.—The Rev. Dr. John Clayton, Dean of Kildare, having made some experiments on coal gas, which he termed a *spirit*, communicated the same to the Royal Society. For the diversion of his friends he was in the habit of collecting the gas in bladders, and lighting it at a pinhole pricked in the side, and by gentle pressure keeping up the flame until the gas was exhausted.

1765.—Mr. Spedding, agent of Lord Lonsdale, proposed to the magistrates of Whitehaven to light the streets of the town with the above gas; but his proposal was refused, though he proved its practicability by using it to light his own office.

1767.—Dr. Richard Watson (afterwards Bishop of Llandaff), in the second volume of his "Chemical Essays," records the fact that gas retains its inflammability after passing through water.

1792.—Mr. William Murdoch, the first person who practically applied coal gas to the purposes of artificial illumination, lighted his own house and office, at Redruth, in Cornwall, with gas. He adapted it also to the lighting of a small steam-carriage which he used in going between the various mines of which he was manager.

1797.—Mr. Murdoch, on his return to Scotland, lighted his premises at Old Cumnock, in Ayrshire.

1798.—Mr. Murdoch lighted up part of the Soho Foundry of Messrs. Boulton, Watt, and Co., at Birmingham.

1802.—Gaslight first used in Paris, by M. Le Bon.

March. At the general rejoicing for the Peace of Amiens, Mr. Murdoch publicly exhibited the new light, by illuminating part of the Soho manufactory.

1803.—Mr. Winsor lectured on gas lighting at the Lyceum Theatre, London.

1804.—Mr. Winsor obtained a patent for an improved oven, stove, or apparatus, for the purpose of extracting air, oil, pitch, tar, and acids from, and reducing into coke and charcoal, all kinds of fuel, also applicable to various other useful purposes. The inflammable gas or air might be used to produce light and heat, or for any other purpose, such as for increasing and multiplying force and power. This was the first patent obtained in connexion with gas lighting.

1805.—The cotton-mills of Messrs. Phillips and Lee, of Salford, lighted with gas by Messrs. Boulton, Watt, and Co., under the direction of Mr. Murdoch, who had now become connected with this establishment.

February 25. A paper entitled "An Account of the Application of the Gas from Coal to Economical Purposes," by Mr. William Murdoch, communicated by the Right Hon. Sir Joseph Banks, Bart., read before the Royal Society. Printed in the Society's "Transactions" in 1808.

Mr. Clegg, a pupil of Messrs. Boulton, Watt, and Co., lighted up the cotton-mill of Mr. Henry Lodge, at Sowerby Bridge, near Halifax.

Lime first used in the purification of gas. This was introduced by Mr. Clegg into the tank of a gasholder he erected to light the dwelling-house of Henry Lodge, Esq., near Halifax.

Mr. Northern, of Leeds, directed public attention to the advantages of coal gas.

Mr. Josiah Pemberton, of Birmingham, began to construct apparatus for generating, condensing, and purifying gas.

Dr. Henry, of Manchester, the distinguished chemist, lectured on coal gas.

1806.—Mr. Clegg, in a communication to the Society of Arts, describes his plan of an apparatus for lighting manufactories with gas.

Mr. J. Pemberton exhibits a number of gaslights of various forms in front of his own manufactory at Birmingham.

1807.—Pall Mall lighted with gas by Mr. Winsor.

The manufactory of Messrs. T. and S. Knight, of Longsight, Manchester, lighted by Mr. Clegg.

Mr. Winsor projects a company for the manufacture of gas, and by means of subscribers succeeds in raising a capital of £20,000.

1808.—A memorial was presented to the King by Mr. Winsor and his associates for a charter of incorporation, which, however, was refused until the sanction of Parliament had been obtained.

Mr. Pemberton erects a gas apparatus for Mr. Benjamin Cook, of Birmingham, applicable for soldering and other purposes.

1809.—The manufactory of Mr. Harris, at Coventry, lighted by Mr. Clegg. Here he introduced a "paddle" at the bottom of the tank to agitate the lime.

The "National Light and Heat Company" applied to Parliament for a bill, but their application was refused.

1810.—The London and Westminster "Gaslight and Coke Company," with a capital of £200,000, obtained their Act of Incorporation.

1811.—A large manufactory at Dolphin Holme, near Lancaster, lighted by Mr. Clegg.

1811.—Stonyhurst Catholic College, Lancashire, lighted by Mr. Clegg. Here he introduced the wet-lime purifier as a separate vessel, the first ever employed for that purpose.

The hydraulic main first used by Mr. Clegg in the lighting of the establishment of Mr. Greenaway, Manchester.

1812.—The Royal Charter granted to the "Gaslight and Coke Company."

The cotton-mills of Messrs. Samuel Ashton and Brothers, at Hyde, lighted by Mr. Clegg with greatly improved apparatus. Here he first attached to the gasholder the mechanism for regulating its specific gravity.

Mr. Clegg lighted the premises of Mr. Ackerman, in the Strand, and his success leads to his being engaged by the Chartered Gaslight and Coke Company as their engineer in 1813.

1813.—December 31. Westminster Bridge lighted with gas.

The Bath House and contiguous apartments at Newport, United States, America, lighted with gas by David Melville. This was the first practical application of gaslight in the United States.

1814.—The authorities of St. Margaret's parish, Westminster, renounce the old oil lamps, and adopt the new system of lighting.

Illuminations took place throughout the country on the occasion of the visit to England of the Allied Sovereigns. In St. James's Park a magnificent pagoda was erected, and illuminated by 10,000 burners; the whole so arranged as to be lighted up instantly at a given signal.

1815.—The gas-meter invented by Mr. Clegg.

A patent obtained for the "rotary retort."

Guildhall lighted with gas. The papers were loud in praise of the new light, describing it as "shedding a brightness clear as summer's noon, but undazzling and soft as moonlight."

The plan of setting each nest of retorts in an oven introduced by Mr. Rackhouse.

1816.—December 9. The gas-governor invented and patented by Mr. Clegg.

Mr. John Taylor, of Stratford, in Essex, obtained a patent for extracting gas from oils, fat, resin, and other oleaginous substances.

From this time to 1823, several companies in Great Britain and on the Continent were formed for producing gas from oil.

1817.—The collapsing gasholder invented by Mr. Clegg.

The vertical atmospheric condenser invented by Mr. John Perks.

April 1. Mr. Clegg retired from the situation of engineer to the Chartered Gaslight and Coke Company.

April 4. Mr. John Malam, of Hull, invented a meter with many important improvements—the L pipe amongst others.

1819.—Mr. David Gordon obtained a patent for making strong vessels in which to compress gas, and make it portable. This led to the formation of the "London Portable Gas Company," which, however, proved unsuccessful as a speculation.

1820.—Paris lighted with gas.

The clay retort patented by Mr. Grafton, of Cambridge.

1823.—The dry-lime purifier now generally in use, and the hydraulic centre-valve, invented by Mr. John Malam.

An Act for lighting Bristol with oil gas was passed.

The second edition of "Peckston's Practical Treatise on the Manufacture of Gas" published.

1824.—The Commissioners of Police for Manchester obtained an Act, 5 George IV., cap. 133, authorizing them to establish gas-works for lighting the town.

1826.—Aniline discovered by Unverdorben.

1832.—Rotterdam, Holland, lighted with coal gas.

1834.—New York, United States, lighted with coal gas.

1835.—Philadelphia, United States, lighted with coal gas.

Amsterdam, Holland, lighted with coal gas.

1838.—The Marquis Montauban took out a patent for improvements in gas apparatus, and for the manufacture of gas from coal tar.

1840.—Chicago lighted with coal gas.

1841.—The third edition of "Peckston's Practical Treatise on Gas Lighting" published.

The first edition of "Clegg on Coal Gas" published.

Cincinnati lighted with coal gas.

1844.—The Hague, Holland, lighted with coal gas.

1849.—Mr. Hills introduced his process of purification by revivified oxide of iron.

The first number of the *Journal of Gas Lighting* published in London.

1852.—April 15. The first number of *Le Journal de l'Eclairage au Gaz* published in Paris.

1853.—Stockholm, Sweden, lighted with coal gas.

Gouda, Holland, lighted with coal gas.

July. The *Gas and Water Times* published in London. Ceased to appear in June, 1858.

The colouring matter, tar red, discovered by Mr. Clift, of Manchester.

The second edition of "Clegg on Coal Gas" published.

1854.—Vera Cruz, Mexico, lighted with coal gas.

Nice, Italy, lighted with coal gas.

Rio de Janeiro lighted with coal gas.

Rome lighted with coal gas.

1856.—September 3. David Melville (Captain), the pioneer of gas lighting in America, died at Newport, R.I., in the 84th year of his age.

Deft, Holland, lighted with coal gas.

The city of Mexico lighted with coal gas.

Fuchsine, or magenta, first observed by Natanson, afterwards by Dr. Hofmann. M. Verguin first brought it forward as a dyeing agent.

Buenos Ayres lighted with coal gas.

Melbourne, Australia, lighted with coal gas.

1857.—February 10. The first number of *Le Gaz* appeared, published in Paris.

Calcutta lighted with coal gas.

Mr. W. H. Perkin and Mr. Puller simultaneously discovered a process by which coal-tar colours could be fixed upon vegetable fibres so as to resist the action of soap.

August 4. The arbitration case of the Great Central Gas Consumers' Company and Alexander Angus Croll, C.E., commenced on this date, and terminated January 16, 1858.

1858.—July. The first number of the *Journal für Gasbeleuchtung* appeared, published at Munich.

1859.—The third edition of "Clegg on Coal Gas" published.

July 1. The first number of the *American Gaslight Journal* appeared, published in New York.

July 23. Alexander Wright, the celebrated gas engineer and manufacturer of gas apparatus, died.

August 13. The "Act for Regulating Measures used in Sales of Gas" received the Royal Assent.

1860.—August 28. The "Act to Amend the Act for Regulating Measures used in Sales of Gas" received the Royal Assent.

August 28. The "Act for Better Regulating the Supply of Gas to the Metropolis" passed.

1861.—January 8. Samuel Clegg, the distinguished gas engineer, died, aged 79 years. Born at Manchester, March 2, 1781. He was a pupil of the celebrated Dr. Dalton, discoverer of the Atomic Theory.

August 6. The "Act to Amend the Metropolis Gas Act" passed.

1862.—October 6. Robert Laing, engineer of the Independent Gas Company, died in his 62nd year.

1864.—May 11. The first general meeting of the British Association of Gas Managers, held at the Mechanics' Hall, Manchester—Thomas Hawksley, Esq., C.E., president, in the chair.

1865.—January 10. James Beaumont Neilson, formerly engineer of the Glasgow Gaslight Company, died in his 73rd year. He was the inventor of the hot-blast process for smelting iron, and of the other process for rendering cloth waterproof, to which the name of his partner (Mackintosh) was given.

1865.—May 31 and June 1. The second general meeting of the British Association of Gas Managers, held at the Institution of Mechanical Engineers, Birmingham—Thomas Hawksley, Esq., C.E., president, in the chair.

1866.—The fourth edition of "Clegg on Coal Gas" published.

May 23, 24. The third general meeting of the British Association of Gas Managers, held at St. Martin's Hall, London—Thomas Hawksley, Esq., C.E., president, in the chair.

1867.—Alfred King, engineer of the Liverpool Gas Company, died in the 70th year of his age.

June 11, 12, 13. The fourth general meeting of the British Association of Gas Managers, held at the School of Art, Nottingham—Thomas Hawksley, Esq., C.E., president, in the chair.

1868.—George Holworthy Palmer, one of the earliest pioneers of gas lighting, and a pupil of Mr. Clegg, died in his 77th year.

June 2, 3, 4. The fifth general meeting of the British Association of Gas Managers, held at the Society of Arts, Adelphi, London—Thomas G. Barlow, Esq., C.E., president, in the chair.

December 22. Testimonial presented to Mr. James Blackburn by the British Association of Gas Managers, on his retiring from the secretaryship of the association, having obtained the appointment of engineer-in-chief to the Oriental Gas Company, Calcutta.

December 25. Mr. George Lowe, the distinguished gas engineer, died in the 80th year of his age. He was the inventor, amongst many other improvements in manufacturing and distributing gas, of the "bladder valve" and the jet photometer.

1869.—June 1, 2, 3. The sixth general meeting of the British Association of Gas Managers, held at the Royal Institution, Liverpool—E. Goddard, Esq., C.E., president, in the chair. Mr. W. H. Bennett elected as secretary of the association.

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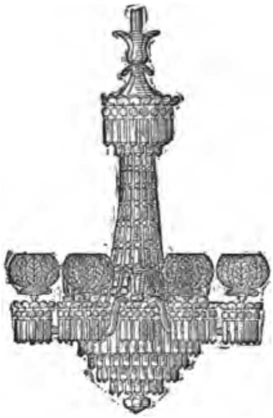

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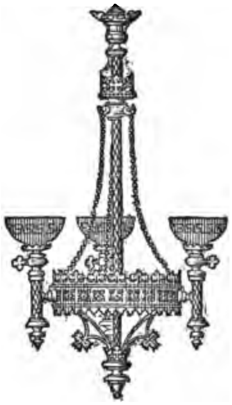

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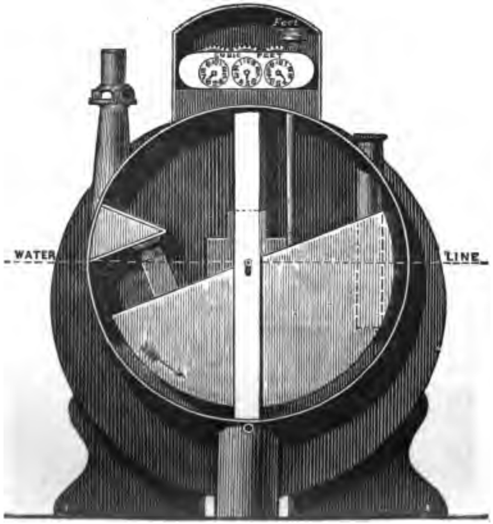

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Extract from the Journal of Gas Lighting, *March* 1, 1870.

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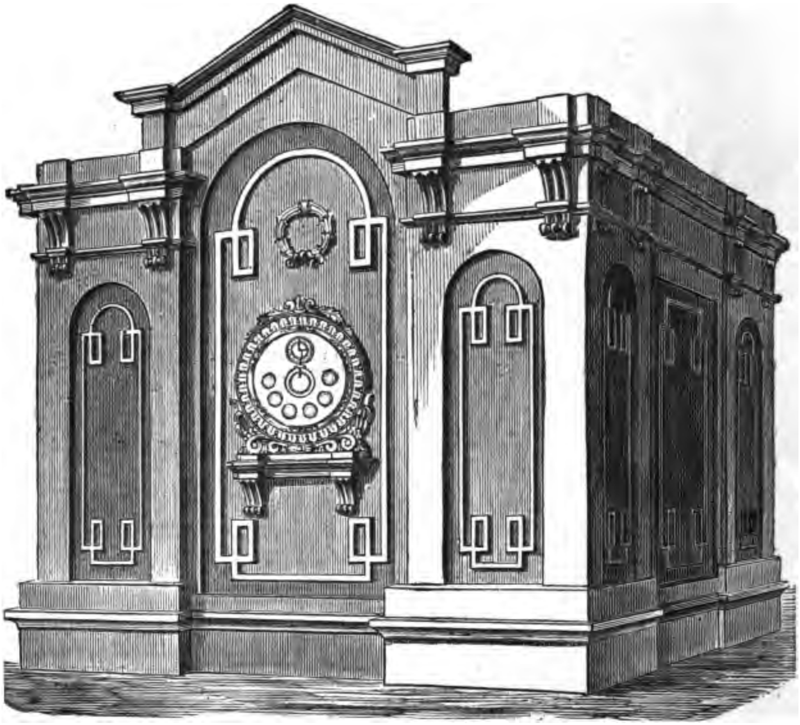

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See Description on page 7.

ESTABLISHED 1827.

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SOLE MANUFACTURERS OF

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Possess a simplicity of construction and facility for Repair greater than any yet produced, while the excellence of the material and workmanship, and accuracy of registration, cannot be surpassed. The superiority of their Dry Meters in Tin Cases is also well known, having stood the test of years.

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WITH THREE DIAPHRAGMS AND ROTARY VALVE,

Has been longer in use than any other Dry Gas-Meter, and is guaranteed to be made with the best Materials and Workmanship.

There are at present upwards of 250,000 of these Meters in use, in sizes varying from 1 to 1500 Lights.

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Is constructed upon the same principle as that with the Three Diaphragms, but it is a much cheaper article, and is guaranteed to keep in thorough working order for Six Years.

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Of the Best Material and Workmanship, carefully adjusted to the requirements of the British Sales of Gas Act and Foreign Standards of Measures.

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Which are uniform with the Ordinary Meters, and register with minute accuracy.

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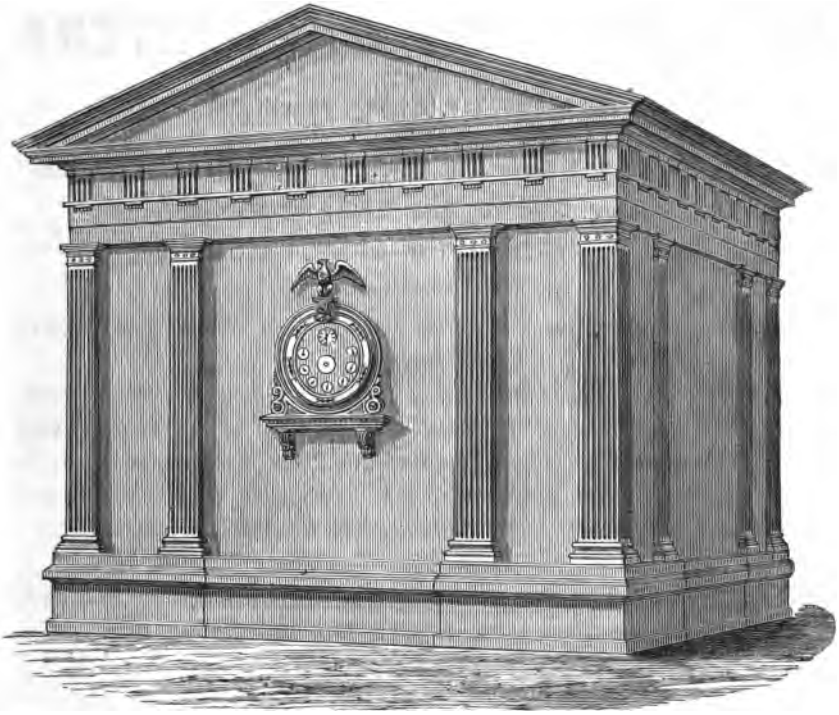

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Home and Foreign Orders promptly attended to.

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TERMS, &c., ON APPLICATION.

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Being the only Meters yet made of Tin Plate in which Screws are used for the whole of the jointing instead of solder.

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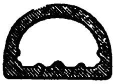
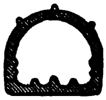


D Clay Retort.



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FRASER'S PATENT RIBBED RETORTS.

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N.B.—A quantity of Retorts in stock. Circulars, 15 in. and 16 in. Ovals, 20 in. by 14 in.
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FIRE-BRICKS, LUMPS, TILES, RETORTS,
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SCOTSWOOD FIRE-BRICK WORKS,
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EDGE'S PATENT
FOR REMOVING THE
CARBONACEOUS INCRUSTATION
FROM
GAS RETORTS.
SIMPLE, EFFICACIOUS, AND ECONOMICAL IN ITS APPLICATION.

For Particulars and Terms, apply to
E. GODDARD, Sole Agent, Gas-Works, Ipswich.

THE DUKE OF HAMILTON'S LESMAHAGOW GAS COAL.

LESSEES:

NITSHILL & LESMAHAGOW COAL COMPANY.

OFFICE:—37, ST. VINCENT PLACE, GLASGOW.

COPY OF ANALYSIS

BY

F. J. EVANS, Esq., Chartered Gas Company, London.

Chartered Gas Company,
Horseferry Road, Westminster, S.W.,
May 22, 1868.

Messrs. The Nitshill & Lesmahagow Coal Co.

Gentlemen,—I beg to submit the following Report of the Analysis of two samples of Cannel Coal, sent to me for examination.

The result of my experiment shows that both samples are Cannels of the highest quality, and I know of none equal to them (Boghead excepted).

The experiments have been very carefully made, and the report is the average of many trials.

I remain, Gentlemen, yours obediently,
(Signed) F. J. EVANS.

ANALYSIS.

Gas per ton	12·750	Feet.	Absorption of Hydrocarbons by means of Bromine	20·00	per Cent.
Coke per ton	9·4	cwt.	Carbonic Oxide	3·125	,,
Ash in Coke	10·85	per Cent.	Carbonic Acid	4·500	,,
Sulphur in Coal	1·42	,,	Sulphuretted hydrogen in foul Gas	0·500	,,
Illuminating power of Gas	35·55	Candles.			

ANALYSIS BY PROFESSOR PENNY.

REPORT OF ANALYSIS OF THE MAIN LESMAHAGOW GAS COAL, *received on the 18th ult. from* Messrs. THE NITSHILL & LESMAHAGOW COAL CO., Auchinheath and Southfield Collieries, Lesmahagow.

Andersonian University, Glasgow, *Nov.* 15, 1869.

The sample of this Coal received for analysis and examination weighed about three cwt., and was certified to have been taken promiscuously, during eight days' work, from three separate portions of the workings of the deepest pit. There cannot, therefore, be the slightest doubt that the sample subjected to analysis, and here reported on, faithfully represented the Coal in bulk, and the average of what is being worked at the present time.

In colour, fracture, and all its other physical qualities, this Coal corresponded with the very finest Gas Coal at present in use.

The following statement contains the mean results of several trials in the usual process of analysis:—

Volatile Matters	49·31	per Cent.	9	cwt.	96½	lbs. per Ton.
Fixed Carbon	42·85	,,	8	,,	63¾	,, ,,
Ash	5·40	,,	1	,,	9	,, ,,
Sulphur	1·14	,,		..	25½	,, ,,
Water	1·30	,,		..	29¼	,, ,,
	100·00		20	cwt.		

GAS AND COKE.

Gas per Ton of Coal	11,500 to 12,000 cubic ft.	Ash in Coke	11·17 per Cent.
Illuminating Power of Gas	34½ to 35¼ stand. cand.	Specific Gravity of Coal	1·285.
Coke per Ton of Coal	9 cwt. 73 lbs.	Weight of a Cubic Foot	80½ lbs.
Combustible Matter in Coke	88·83 per Cent.		

REMARKS.

The foregoing results are in the highest degree satisfactory. They conclusively show that in chemical composition, as well as in its gas-yielding powers, this Coal takes the very foremost rank among the Gas Coals at present in use. I have never had occasion to analyze and examine a Coal which more completely realizes all that is required in a first-class gas-yielding material. It is pre-eminently superior in the three important points essential to a first-class Gas Coal, viz.—1st, Quality of Gas; 2nd, Illuminating Power of Gas; and 3rd, Quality and Quantity of Coke.

The quantity of Gas that it affords is greater than the average of any other Scotch Gas Coal, except Torbanehill Coal, which, however, is worthless as regards its Coke. Of course, the quantity of Gas obtained from Coal may be increased or diminished by varying the heat at which it is distilled; and hence I have, in the foregoing report, quoted the maximum and minimum quantities obtainable by properly conducting the process.

The illuminating power of the Gas from this Coal is remarkably high, and hence it will prove extremely serviceable for mixing with second-class Coal. The luminosity will be subject to variation in common with the quantity according to the degree of heat at which the Coal is distilled.

The quality of its Coke is first-class. The quantity is very nearly one-half of the weight of the Coal itself, and its heating power is all that could be desired for a first-class Coke from Gas Coal.

(Signed) FREDERICK PENNY, *Professor of Chemistry.*

BOGHEAD GAS COAL.

JAMES RUSSEL & SON,

FALKIRK, N.B.

One hundred parts of the Coal, by Professor FYFE's Analysis, afforded, on an average—

Volatile Matter . . 69

$$\text{Coke} \ldots\ldots\ 31 \text{ consisting of} \begin{cases} \text{Carbon, } 9{\cdot}25 \\ \text{Ashes, } 21{\cdot}75 \end{cases} \begin{matrix} = 30 \text{ per cent.} \\ = 70 \quad ,, \end{matrix}$$

100 . . . 31·0 . . . 100

The Specific Gravity is 1180 compared to that of Water at 1000. The per centage of Sulphur amounted to 0·13, equivalent to nearly three pounds in the Ton of Coal.

Table showing Comparative Value of the following Coals for making Gas :—

COALS.	Cubic Feet of Gas per Ton.	Illuminating Power. 1 Ft.=Light of Candles 120 Grs.	Comparative Value of Gases according to Illuminating Power.		Comparative Value of Coals according to Illuminating Power and Quantity of Gas afforded.	
Best English Caking	9,746	3·18	1·00		1·00	
Average Lesmahago	10,176	8·77	2·75	1·00	2·87	1·00
Average Boghead	**15,486**	**10·39**	**3·25**	**1·18**	**5·17**	**1·77**

Table showing Comparative Value, by the Chlorine Test, of the Boghead and other Coals for making Gas :—

COALS.	Cubic Feet of Gas per Ton.	Condensation by Chlorine in 100 Parts.	Durability. With Jet Flame 5 Inches, 1 Foot burns		Value of Gas according to Condensation by Chlorine, and to Durability.	Value of Coals according to Value and Quantity of Gas.	Comp. Val. of Scotch Coals, only taking Value&Quantity of Gas into Account.
			MIN.	SEC.			
English Caking .	9,746	6·5	50	40	1·00	1·00	—
English Parrot . .	10,500	7·6	44	30	1·02	1·08	—
Marq. of Lothian's	10,000	13·0	60	0	2·35	2·41	1·00
Lesmahago . . .	10,176	17·5	70	0	3·72	3·87	1·64
Wemyss	10,000	19·5	75	0	4·44	4·55	1·94
Kirkness	9,620	20·75	80	18	5·06	4·99	2·06
Boghead	**15,486**	**23·37**	**84**	**22**	**6·09**	**9·67**	**4·01**

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HUCKNALL COLLIERY COMPANY

CAN SUPPLY A

CANNEL COAL

YIELDING A LARGE QUANTITY OF SUPERIOR GAS.

From the position of these Collieries, railway rates are very favourable to all Midland, Eastern, and Southern towns, and the Cannel can thus be delivered at a comparatively low price to Gas-Works so situated.

Price and information on application to—

THE HUCKNALL COLLIERY COMPANY,
HUCKNALL TORKARD COLLIERIES,
Near NOTTINGHAM.

CANNEL AND COAL

OF THE BEST DESCRIPTIONS

FOR MAKING GAS AND COKE.

Gas Cannel; Ditto, Hand-picked; Gas Coal, ditto;
House and Steam Coal.

Concession in Prices for large quantities.

Analysis and Prices supplied on application.

GAS APPARATUS

Of all descriptions, and on the most approved principles; also Purifying and other materials supplied.

PLANS AND ESTIMATES,

And other information required, and the highest references furnished, on application.

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For Materials and Works entered into. No charge made for superintending Shipment, preparing Bills of Lading, or passing Entries.

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CANNEL COAL.

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COPPA COLLIERY, MOLD,

Beg leave to call the attention of Gas Companies to the superior quality of their Cannel for Gas-making purposes. This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

Ports of shipment—Birkenhead or Connah's Quay.

Waggons supplied for delivery by railway to any part of England or Wales.

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SWANWICK CANNEL.

This is a superior Cannel: liberal yield; illuminating power 24 candles, and coke good.

Terms and Analysis forwarded on application to—

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The Subscriber is prepared to contract for the Supply of all the principal Scotch Cannel Coals. Prices and Analyses of the various Coals will be forwarded on application.

JAMES McKELVIE,
CANNEL COAL MERCHANT,
HAYMARKET, EDINBURGH.
ESTABLISHED 1840.

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Yields 10,827 feet of 32-Candle Gas, or 56 Gallons of Crude Oil, per Ton.

Shipped in the Forth.

Apply to—

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PIRNIE COLLIERY,
LEVEN, FIFE.

CHAPELSIDE GAS COAL.

Report of the Chemical Analysis and Practical Assay

OF THE

CHAPELSIDE CANNEL COAL,

BELONGING TO

Messrs. FERRIER & STRAIN, Airdrie and Chapelside Collieries, Airdrie,

By Dr. WALLACE, F.R.S.E., F.C.S., GLASGOW.

I HAVE made a Chemical Analysis and Practical Assay of a sample of Cannel Coal, comprising the entire thickness of the seam, received from Messrs. FERRIER & STRAIN, and have found it to contain—

Volatile Matters, containing ·14 Sulphur		55·81
Coke,	Fixed Carbon, 32·97 Sulphur, ·10 Ash, 7·80	40·87
Water		3·32
		100·00

Coke per Ton of Coal	8 cwts. 20 lbs.
Ash in 100 parts of Coke	19·08
Sulphur in 100 parts of Coke	·25
Specific Gravity of the Coal (Water 1000)	1226
Weight of a Cubic Foot in pounds	76·4
Oil, Crude, per Ton of Coal, in gallons	59
Gravity of the Oil (Water 1000)	889
Gas per Ton of Coal, being the mean of four trials	11,272 Cubic Feet.
Illuminating Power of 5 Cubic Feet per hour	35·61 Candles.
Value of 1 Cubic Foot of Gas in grains of Sperm	855
Value of a Ton of Coal in pounds of Sperm	1376
Durability of 1 Cubic Foot by 5-inch flame	68 Minutes.

REMARKS.

This is a first-class Cannel Coal, being quite equal, as regards quantity and quality of Gas, to the Lesmahagow Coal. The Coke is of medium quality, but quite suitable for firing the retorts in a Gas-Work, and contains a mere trace of Sulphur.

As an Oil-yielding material this Coal is very valuable, the produce being large, and the quality of the Oil very good.

WILLIAM WALLACE.

LABORATORY, 42, BATH STREET, GLASGOW,
June 30, 1869.

THE "LOTHIAN" CANNEL COALS.

These Cannels are extensively used in the Gas-Works of Edinburgh, where the Illuminating Power of the Gas is the highest in Britain.

The yield per ton is 12,573 cubic feet; illuminating power, 33·8 standard candles; coke per ton, 1046 lbs.

Ports of Shipment, in the Firth of Forth.

BO'NESS CANNEL COALS.

This Cannel is largely used in Gas-Works, where, in addition to high Illuminating Power, there exists a demand for superior Coke, it being the best Coke-producing Cannel of all Scottish Cannels. It yields about 11,000 cubic feet of 25 standard candle gas per ton.

STEAM & HOUSE COAL OF THE BEST QUALITY,

Being on the List for the Admiralty Contracts.

Ports of Shipment, either the Forth or the Clyde.

Apply to J. and W. ROMANS, 53, Frederick Street, EDINBURGH; 1, Walbrook, Mansion House, LONDON; and at the "Crown" Wharf, Thomas Street, Limehouse Cut, LONDON, where samples may be seen.

THE MACKENZIE
PATENT
GAS COAL COMPOUND.

The Patentee calls the special notice of Gas Engineers to this Compound, which has been proved to be the best method of enriching bituminous gas coals, and the most economical mode for the production of a permanent gas of high illuminating power. The great importance of this invention to Gas Companies will readily be appreciated when it is known that by means of its adoption they are rendered independent of the fluctuations in the price of cannel coals, thereby making their profits certain. Evidently, therefore, it is their interest to encourage the use of this Compound, thus increasing the sources of supply of gas coals, and consequently ensuring competition for their supply.

Reference is permitted to the Alliance and Consumers' Gas Company, of Dublin, where it is at present worked on a large scale, that city being now entirely lighted by this process; and the following Testimonials from eminent experts, and extracts from public journals, selected from many others, are submitted:—

From Thomas G. Barlow, *Esq., C.E., President of the British Association of Gas Managers.*

The advance in the price of cannel coal, consequent on the increased consumption, has stimulated inquiry to find a substitute for it; and this has been accomplished by Mr. Mackenzie, whose process has been successfully adopted on a large scale at the Alliance Gas-Works, in Dublin. The cost of this Compound at Dublin was about 17s. per ton, against 24s. for cannel, over which it has the advantage of at least 5s. per ton in the value of the coke.

From F. J. Evans, *Esq., Engineer of the Chartered Gas Company, London.*

I have much pleasure in testifying to the value of your invention for combining mineral oil with ground coal for the purpose of manufacturing gas. The coke is of first-rate quality, and this forms one of the valuable features of your invention. I kept the gas made in the last experiment, and have ascertained that after nearly two months it had only lost two candles in illuminating power. I consider this experiment most satisfactory, as it proves that a permanent gas is formed, and not, as many contended, a mere mixture of hydrocarbon vapours.

From John Somerville, *Esq., Engineer of the Alliance and Dublin Consumers' Gas Company.*

I may state that your process has been in successful operation in these works for a considerable period, and has given satisfaction to this company, which has used upwards of 100,000 tons. I consider that, in money value, one ton of your patent coal, at the strength worked here—namely, compounded with 3½ per cent. of oil—is equal to one ton of best Wigan cannel for raising the illuminating power of ordinary 12-candle coal gas to 17 candles, besides having the advantage of a superior coke. Also I find it is well adapted for working with the patent drawing and charging machinery we have in use here.

From George Livesey, *Esq., Engineer of the South Metropolitan Gas Company, London.*

I have used the last cargo of your patent coal received from Walker, Bruce, & Co., and found the illuminating power quite equal to Wigan cannel, leaving a superior coke, and the men prefer greatly to handle it, to that of cannel.

From D. Hunter, *Esq., Engineer of the Greenwich Gas-Works.*

The working of your patent coal at these works gave me great satisfaction. I found that by using 8¾ to 9 per cent. of your Compound, intermixed with our ordinary gas coals, I kept up a steady illuminating power of 15 candles, and more regular than when using cannel coal for the same purpose.

From Thomas R. Brown, *Esq., Chief Engineer of the Philadelphia Gas-Works.*

I have tested the condensability of gas produced from coal, treated by the Mackenzie process, as compared with gas produced from same coal by itself, by passing them both through a freezing mixture at a temperature of 22° below the freezing point, with the following results:—

Gas from the Mackenzie Compound lost 11 05/100 per cent.
Gas from the same coal alone lost . . . 12 24/100 per cent.
Showing a difference of about 1¼ per cent. in favour of the patent gas.

From Joseph A. Sabbaton, *Esq., Engineer of the Manhattan Gaslight Company, New York.*

I have examined Mr. Mackenzie's method of using petroleum and coal oils in connexion with caking coals for the purpose of making illuminating gas. I consider his method valuable, and well adapted for generating gas of high illuminating power. Mr. Sabbaton also confirms Mr. Brown's statement as to the condensability of the gas, the result being quite in accordance with his own experiments, by which he found that the lower the temperature the more it was in favour of the Mackenzie gas.

From W. Romans, *Esq., late Engineer of the Alliance and Dublin Consumers' Gas Company.*

I wish particularly to state that this company required to keep a staff of what are called pipe-jumpers, to auger choked ascension and arch pipes, whereas in working the patent coal none are required, which is a saving of £400 per annum in wages, according to the company's books. The patent coal has also the effect of dissolving the naphthaline which occasionally chokes the mains and service-pipes. In the purification of this gas per wet lime principle, 35 per cent. less lime is required for removal of sulphur than in the ordinary process of purification of 17-candle gas.

From Dr. Charles M. Cresson, *Gas Chemist and Consulting Engineer to Philadelphia Gas Trust.*

I have examined and made trial of Mackenzie's Compound for obtaining illuminating gas, and find it well adapted to the purpose. Coal yielding a 14·17-candle gas, by the addition of 1 per cent. of oil yielded a gas of 15·66 candle power, with an increase of volume equivalent to 10 feet of gas for each pound of oil added, or 1·49 candle power additional for each 1 per cent. of oil. The advantages possessed by gas companies of thus increasing the sources of supply of gas coals, and of ensuring competition for their supply, evidence the great value of the invention of Mr. Mackenzie, and I unhesitatingly recommend the process to their favourable consideration.

From the "Scottish American Journal."

The merit of adapting mineral oils to the production of gas by a very simple and practicable method, and one which can be adopted at once by any gas company without alteration in their retorts or their present mode of operation, belongs to Mr. George Mackenzie, of Glasgow. This invention consists in the compounding of coal and oil together, in such a manner that the easy ignition of the oil is destroyed, without increasing that of the coal, while the gas produced possesses that peculiar brilliancy and freedom from impurities only obtainable from mineral oils. The coke likewise is much improved in quality and increased in value. The process may be thus briefly described:—A small proportion of the coal is finely pulverized, by being passed under heavy rollers, and is compounded, under pressure, with the oil; it is then intermixed with rough coal in such proportions as may be necessary to produce the required degree of illuminating power. When the coal is thus treated, it can be readily handled without loss of oil, being apparently as dry as in its natural state, and it can be transported to any distance without loss by evaporation. Experience also proves that it can be safely stored in large quantities, and for a considerable length of time, without any deterioration in quality. In actual practice it has been found that by the addition of 5 per cent. of oil to a coal yielding only 12-candle gas, the illuminating power is raised to 18 candles, with an increase of 2½ per cent. in quantity, besides an improvement in the quality of the coke.

From the "American Gaslight Journal."

MACKENZIE'S COMPOUND GAS COALS.

This process has been described in this journal before, and we now take pleasure in reverting to it again, and laying before our readers some further testimonials, going to prove the great value of this invention in the economical production of gas of high illuminating power. Fifty tons of this Compound have recently been used at the Manhattan Gas-Works in this city, with results giving great satisfaction. Coals which only gave 11-candle gas in the ordinary way, when compounded with 6 per cent. of oil gave a yield of 18½ candles, and a superior quality of coke. The value of oil as an enricher of coal gas has long been well known, but it never has been used in a practical manner till now. In this combination or Compound, the oil seems to be decomposed more slowly, and the vapours unite more perfectly with the vapours of the coals, to produce a gas of just such quality as may be desired. The value of this invention will be appreciated by all engineers and gas men who are obliged to use in combination high-priced cannel coals, to bring up the candle power to the proper standard.

GEORGE MACKENZIE, Patentee,

37, Abbotsford Place, Glasgow.

THORNELOE AND COMPANY,

34, LONDON WALL, LONDON, E.C.,

GAS AND WATER ENGINEERS,

AND

CONTRACTORS for GAS & WATER WORKS APPARATUS.

WHOLESALE DEALERS IN

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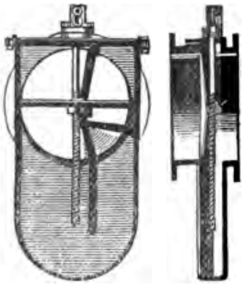

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NEW FLEXIBLE VALVE,

FOR

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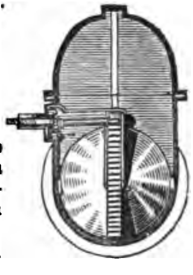
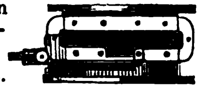


This Valve has been designed to meet what has hitherto been felt a great want in Gas-Works especially—namely, a *really tight* Valve which could be depended upon.

The new Valve is simple in construction, not liable to get out of order, cheap in price, and the principle can be adapted to every part of Gas Apparatus where a Valve is required.



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Messrs. THORNELOE & COMPANY prepare Designs, Plans, Specifications, and Estimates for the Construction of New or the Improvement of Old Works, and for every description of Apparatus used thereon; and are prepared to advise Directors or Managers of Gas and Water Companies on all matters connected with their operations.

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With special facilities for adjusting and repair, the principal parts of the mechanism being accessible by the removal of a single screw.

Gas-Meters on the Wet and Dry principles made in Cast-Iron and Tin-Plate Cases.

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IMPROVED GAS APPARATUS,

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ESTIMATES, PLANS, AND SPECIFICATIONS PREPARED FOR BUILDINGS AND APPARATUS.

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⁂ *Please address Letters to Huddersfield.*

REFERENCES TO NEARLY 300 GAS-WORKS.

CATHELS'S
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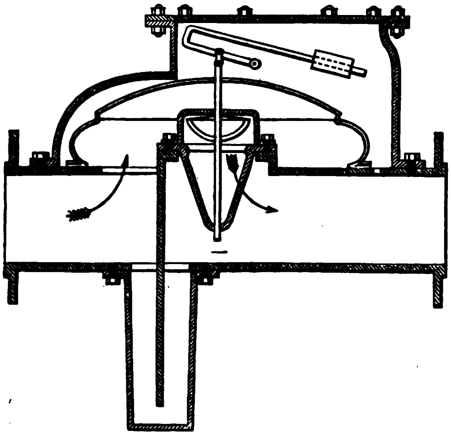

Wasteful leakage, and the other bad effects of high pressures, have hitherto had to be submitted to by Gas Companies supplying hilly districts, for the want of some efficient and easily applied controlling power. This Governor effectually supplies this want. By its use the pressure at any given point of elevated ground can be reduced to the extent desired, and will at the same time be **Proportionately Increased and Diminished with the Initial Pressure.** When once fixed and adjusted, the Governor is entirely self-acting, the outlet pressure being the governing power. It is now in general use in various sizes, with the most satisfactory results.

Illustrated Circular, with Directions for Fixing, and Prices, &c., on application to the Manufacturers—

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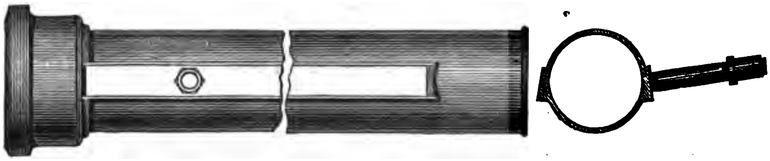
ROTHERHAM, YORKSHIRE.

CATHELS'S
PATENT RIBBED GAS MAIN-PIPE.



Instead of the unavoidably defective connexion with the service-pipes obtainable with the ordinary gas mains of the smaller sizes, consisting as they necessarily do, owing to the thinness of the body of the pipes, of but one or two threads, too often shaken loose and leaky by the mere ramming of the ground over the service when laid, or subsequently rendered so by the oscillation caused by the traffic over them, the above simple and inexpensive expedient, by giving a proper thickness of metal where it is required to tap into, ensures a **Perfect and Permanent Gas-tight Joint.** Cost about 1d. to 2d. per yard (depending on the size) more than ordinary plain pipes.

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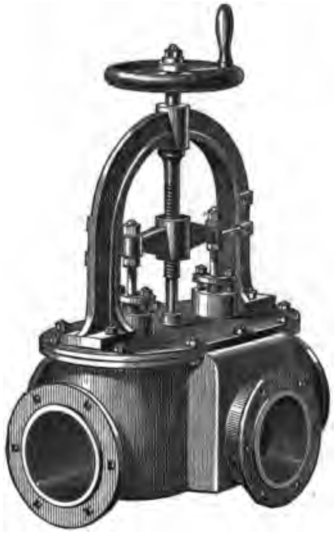
PATENT

FOUR-WAY DISC GAS-VALVE



Is the best Valve for Gas-Works, both as a Bye-pass and when applied to Purifiers. It is simple, strong, and durable, and, being entirely free from rubbing surfaces, *never sets fast.* **ONE VALVE SERVES AS THREE OTHER VALVES;** and as the closing of one gas-way opens another, it is impossible to accidentally stop back the gas. The direction of the flow of the gas can be seen at a glance; and the ports being all on the same level enables the connexions to be simple runs of straight piping.

Descriptive Circular, Prices, &c., on application to the Makers,

MESSRS. GUEST & CHRIMES,

FOUNDRY & GENERAL BRASS WORKS,

ROTHERHAM.

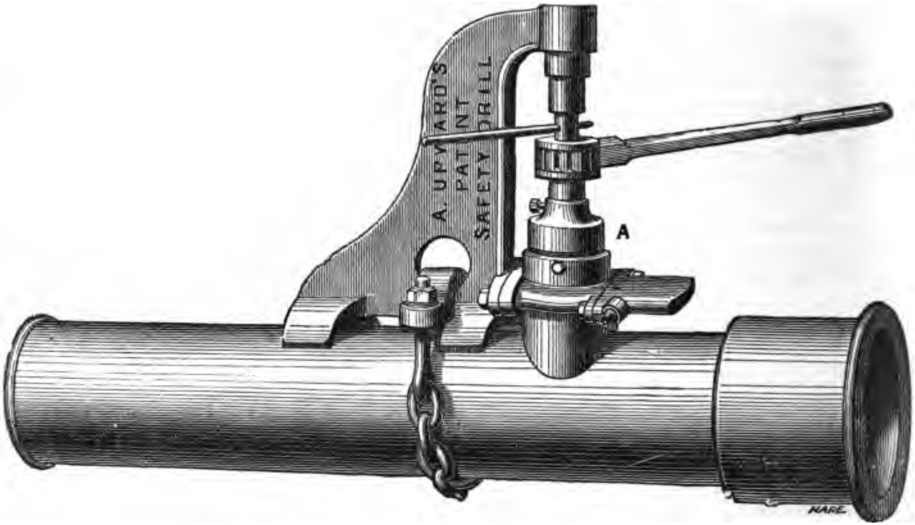
A. UPWARD'S

PATENT SAFETY

DRILLING AND TAPPING APPARATUS,

FOR CONNECTING SERVICES TO

GAS AND WATER MAINS UNDER PRESSURE.



THIS APPARATUS EFFECTS THE FOLLOWING IMPORTANT OBJECTS, VIZ.—

1st. A sound service connexion, by the hole being perfectly round, and thoroughly well tapped the whole thickness of metal.
2nd. A speedy method of connecting services, the hole being tapped without removing the drill.
3rd. Prevention of the leakage wasted by the old method.
4th. Safety from personal injury, fatal accidents, or loss of property.

The late Fires caused by the escape of Gas, in connecting services, having destroyed a large amount of property, entailing great loss to the Gas Companies, it has been ruled—"That all Gas Companies are required to use the most approved and perfect apparatus for the purpose of making service connexions;" and heavy risk is incurred if accidents arise from want of attention to this important rule.

A. UPWARD'S PATENT SAFETY APPARATUS has already been adopted by most of the London Gas Companies.

WHOLESALE AGENTS AND SOLE MANUFACTURERS,

TANGYE BROTHERS & HOLMAN,

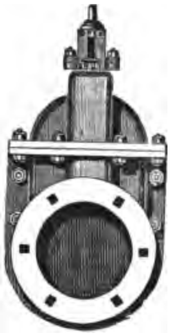
10, LAURENCE POUNTNEY LANE, LONDON, E.C.,
AND BIRMINGHAM (TANGYE BROTHERS), CORNWALL WORKS, SOHO.

For Licence, apply to Mr. A. Upward, Chartered Gas Company, 146, Goswell Road.

C. & W. WALKER'S

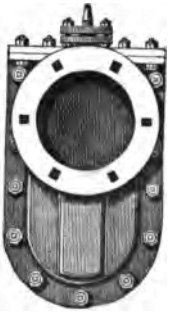
GAS-VALVES.

A



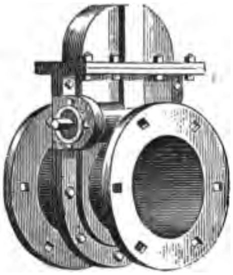
Above-ground Screw Wedge-Valve, for the important parts of Gas-Works.

B



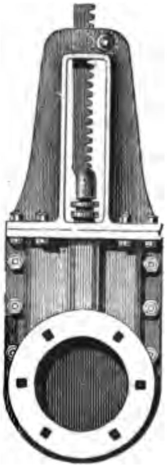
Under-ground Screw-Valve, for regulating pressures in the Street Mains.

C



Internal Rack Gas-Valve.

D



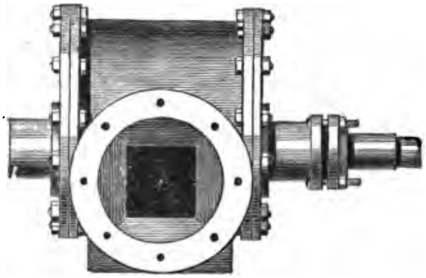
Ordinary Rack-Valve, with strong undamageable racks and pinions.

There are few things more important upon a Gas-Work than perfectly tight Gas-Valves to hermetically seal a Gas-Main, and prevent the possibility of the passage of the smallest volume of foul gas. The Engineer of a Gas-Work can place the fullest reliance upon these Valves.

C. & W. Walker also have specially constructed Screw Double-faced Gas-Valves for the larger-sized Gas-Mains, particulars of which are sent on application.

Midland Iron-Works, Donnington, near Newport, Shropshire;
8, FINSBURY CIRCUS, LONDON.

ROTATORY & PUMPING GAS-EXHAUSTERS.



From 250 to 250,000 Cubic Feet per Hour.

J. BURTON, SONS & WALLER,

MAKERS OF

ENGINES, BOILERS,

And all Machinery specially adapted for

GAS-WORKS.

SINGLE AND DOUBLE ACTING TAR, LIQUOR, AND SYPHON PUMPS.

GAS-VALVES IN STOCK, 2 to 30 inches.

COAL-LIFTING MACHINERY,
By Hydraulic and Steam Power.

WATER DISTRIBUTORS, on MANN'S, PADDON'S, and other Plans.

SCRUBBERS, CONDENSERS, and PURIFIERS, with Lifting Gear.

MAIN-LAYING and CONNEXIONS in all their Branches.

Station & Hydraulic Governors, also for Steam and Gas Throttle-Valves.

IMPROVED SELF-ACTING BYE-PASS VALVE, WITH RELIEVING LEVER.

Stoking Tools, Scoops, Coke Barrows, &c.

NEW and SECOND-HAND EXHAUSTERS, ENGINES, and BOILERS IN STOCK.

Plans made and Estimates furnish'd on application.

THE PHŒNIX ENGINEERING WORKS,
Holland Street, Southwark, London, S.E.,
Between Blackfriars and Southwark Bridges, and near the Phœnix Gas-Works.

KITTOE & BROTHERHOOD,

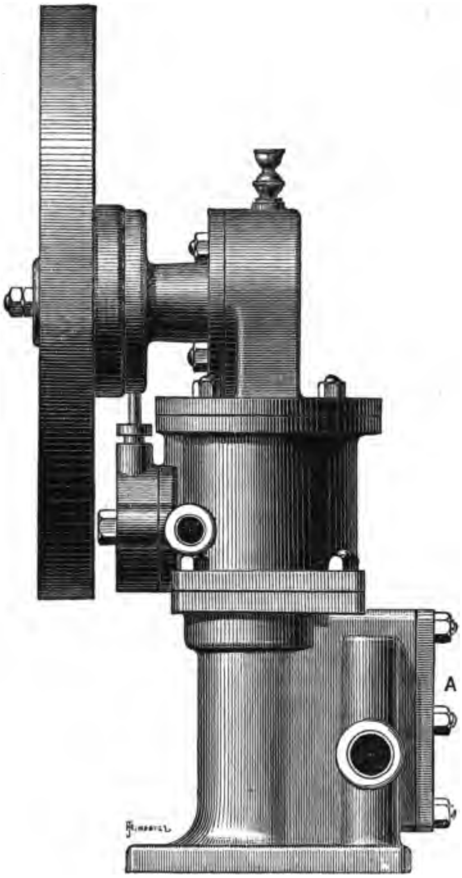
Mechanical Engineers, Millwrights, and General Iron Founders,

56, COMPTON STREET, LONDON, E.C.,

Manufacturers of Brewery, Distillers', and Pharmaceutical Plant,

AND OF THE

PATENT PARAGON STEAM-PUMP.



These Pumps have undergone many alterations since their first introduction, and may now be considered as quite perfect. Since the introduction of Messrs. Kittoe & Brotherhood's Patent Valves, the power has been greatly increased, by reason of their being driven at much higher speeds, without noise or shock of any kind. By removing the cover marked A, all the Valves are exposed to view, and may be cleaned or replaced at a few minutes' notice.

Of the various purposes for which the "Paragon Pumps" are eminently suited, the following may be cited:—

For pumping in Breweries, Tanneries, Distilleries, Paper Mills, Sugar-Houses; Starch, Soap, Dye, and Chemical Works; Water, Gas, and Sewage Works. For Draining Mines, Quarries, and Irrigating Land; Filling Tanks at Railway Stations; as Fire-Engines for Factories, Towns, Mansions, Ships, and Dockyards; as Force Pumps for Hydraulic Presses, Lifts, Cranes, &c., &c.

PRICES AND SIZES.

No. 1 will deliver	200 gals. per hour,	£10	No. 4a will deliver	1200 gals. per hr.,	£25
,, 2 ,,	300 ,,	£12	,, 5 ,,	2500 ,, double	£35
,, 3 ,,	400 ,,	£15	,, 6 ,,	7400 ,, acting	£50
,, 4 ,,	600 ,,	£20			

These quantities are delivered at the minimum speed of Pumps; they may be run at a higher speed, and will deliver accordingly.

LARGER SIZES MADE TO ORDER.

SAM. CUTLER & SONS,

Contracting Gas Engineers,

GASHOLDER & GENERAL GAS APPARATUS MAKERS,

MANUFACTURERS OF

BOILERS, IRON ROOFING, IRON BRIDGES,

AND GENERAL IRONWORK.

◆

S. C. AND SONS undertake Contracts of any magnitude for the **Erection of new and Remodelling of existing Gas-Works,** for **Gasholders, Cast and Wrought Iron Tanks, Iron Roofs,** and every description of **Apparatus** for the Manufacture and Distribution of Gas.

Special attention is invited to their "**Improved Condenser,**" which is very effective, and much approved; also to their patterns of **Annular** and other **Condensers, Scrubbers,** and **Purifiers,** of all sizes, which they arrange either with **Centre** or Ordinary **Slide Valves.**

WORKS FOR THE SUPPLY OF

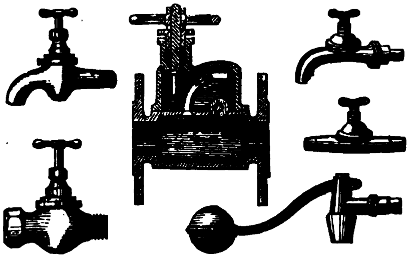
VILLAGES, MANSIONS, FACTORIES, &c., &c.

S. C. AND SONS undertake the **Supply** and **Laying** of **Mains** for **Gas and Water,** and supply all Castings, Connexions, and Fittings for Retort-House, Works generally, and for Streets. They also supply **Valves** of all descriptions, Iron and Clay Retorts, Hot-pressed Retort-Lids, Steel Charging-Scoops of improved make, for which they have special machinery, Improved Coke and Coal Barrows, Cross-Bars and Screws, Bolts and Nuts, Furnace and Stoking Tools, Iron and Wood Purifier-Sieves, Lead, Yarn, Borings, &c., including every requisite whatsoever for a Gas-Works, a well-assorted stock being kept of those goods most in request.

SOLE MAKERS OF BRETT'S PATENT COKE BARROW.

Experienced Retort Setters sent to any part of the Kingdom.

Address: PROVIDENCE IRON-WORKS, MILLWALL, LONDON.



JOHN WARNER & SONS.

Bell and Brass Founders to Her Majesty,
8, CRESCENT, CRIPPLEGATE, LONDON, E.C.

WARNER'S
PATENT QUADRANT-MOTION
SLUICE or GAS VALVE.

All the advantages of the ordinary Sluice-Valve are obtained at much less cost, and the liability to set fast and get out of order entirely obviated.

Particulars of the Quadrant Valve, also of Hydraulic Machinery, High or Low Pressure Cocks, Water-Closets, Gas-fitting in all its branches, and general Plumbers' Brass-work, can be obtained upon application.

LAMBERT BROTHERS,

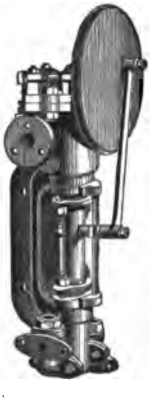
ALPHA
TUBE & FITTING WORKS

WALSALL, STAFFORDSHIRE.

ALEXR. WILSON & CO., ENGINEERS,

VAUXHALL IRON-WORKS, NINE ELMS, LONDON, S.W.,
MANUFACTURERS OF

IMPROVED DONKEY PUMPS,



Injectors, Safety-Valves, Stop-Valves, and Boiler Mountings of every description,

CRANES AND HOISTS.

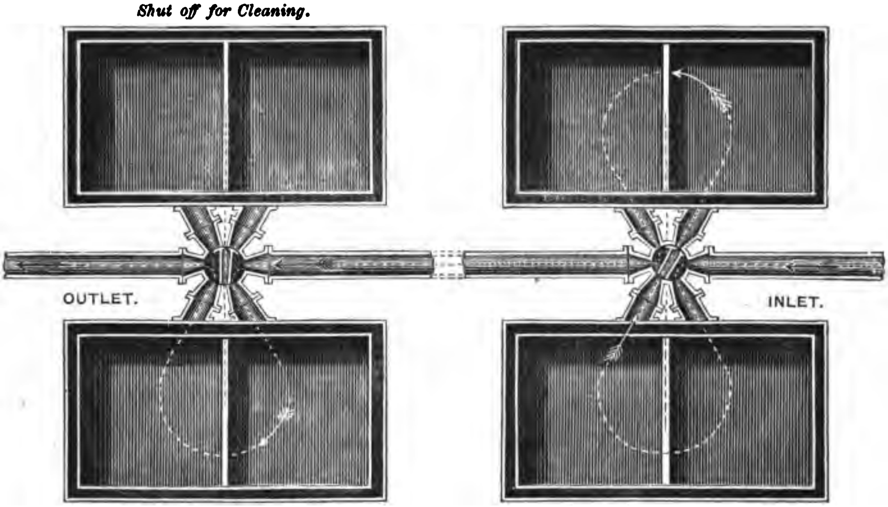
Special attention is called to their "VAUXHALL" DONKEY PUMPS, which are the best boiler feeders yet brought before the users of steam power. For boilers supplying steam to apparatus other than a steam-engine they are indispensable, and are rapidly supplanting the use of the feed-pump on the engine. They are in use at the Phœnix, London, Imperial, and Western Gas Companies, London, besides many provincial Gas-Works. Larger sizes, for pumping Water and Ammoniacal Liquor.

REDUCED PRICE LIST.
Those marked * are double-acting.

Size.	Diameter.	Stroke.	Gals. thrown per Hour.	H.P. of Boiler supplied.	Price.		
No. 4	1¼ inch	2¼ inch	150	10	£6	10	0
5	1½	3	230	15	8	10	0
6	1⅞	4	460	30	11	0	0
7	2¼	4	600	40	13	0	0
*8	2¼	4	900	60	15	10	0
9	2½	6	1200	75	17	0	0
*10	2⅝	6	1800	120	19	0	0
*12	2¾	6	2250	150	25	0	0

All sizes in stock. *Circular on application.*

PLAN OF GAS-PURIFIERS
WORKED BY
CLAYTON'S PATENT SIX-WAY VALVE.



This Valve has the following advantages:—

Only One Valve is required to work Two Purifiers.
More than *Three-Fourths* of the Connexion-Pipes are saved, whereas there is less chance of stoppage.
There is not the slightest chance of these Valves being made up, as they sweep themselves clean every time the Plug is moved.
There are no Springs or Racks to get out of order or require repairs, thus rendering the Valves very durable.
There are no Pipes round the Purifiers, therefore they can be placed in much less room. The Plug can be easily lifted out for interior examination.
There is little or no Foundation required, as in ordinary Valves, consequently lessening the expense.
The Plug being conical, and the bottom of the Valve chambered out, there is not the slightest chance of these Valves becoming leaky, as ordinary flat-surfaced Valves, where sweepings get pressed down in the seat.
The taper of the Plug is such that it does not become fixed in the Barrel from disuse.

CLAYTON, SON, & CO.,
PROVIDENCE IRON-WORKS,
HUNSLET, LEEDS.

GAS PURIFICATION.

O'NEILL'S HYDRATED PEROXIDE OF IRON.

This Material is now exclusively used in several of the largest London and Provincial Gas-Works. It is acknowledged to be the best and most economical in the market, and is rapidly superseding all others. A pamphlet, giving analysis and comparative results with other oxides and lime, will be forwarded on application.

JOHN WM. O'NEILL & Co.,
57, BISHOPSGATE STREET WITHIN, LONDON.
LONDON DEPOT—VAUXHALL.

NATURAL HYDRATED OXIDE OF IRON,

Superior quality, constantly on Sale at

MARTYN, DENNIS, & CO.'S,
2, ORIEL CHAMBERS, WATER STREET, LIVERPOOL.

BENJ. WHITEHOUSE,

(ESTABLISHED IN 1765,)

HARVILLS HAWTHORN WORKS,
WEST BROMWICH, NEAR BIRMINGHAM,

MANUFACTURER OF

TELESCOPE & SINGLE GASHOLDERS,

STEAM-ENGINE AND ALL KINDS OF BOILERS, WROUGHT-IRON ROOFS,
PURIFIERS, SCRUBBERS, & GENERAL GAS APPARATUS,
And all kinds of Wrought-Iron Work.

TO GAS COMPANIES AND LOCAL BOARDS.

KEEN'S PATENT DOUBLE-CLIP STREET-LAMP

Is introduced to the notice of the above as being more efficient and economical than any yet produced, and possessing the following advantages:—The glass is easily secured by the Clips instead of putty, which gives freedom for expansion and contraction, thus removing all liability of fracture, and the frame being protected by the Clips, gives a finished appearance to the Lamp, and ensures its durability.

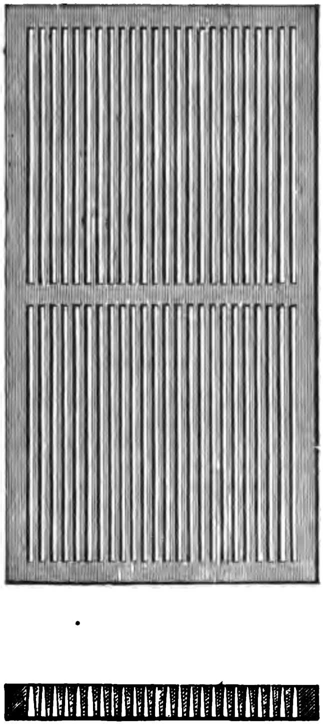
TESTIMONIAL.

I have great pleasure in testifying to the excellence of your Patent Lanterns. After a trial of nearly twelve months, I find there is less breakage of glass resulting from their use, coupled with perfect ventilation of the gas-light. The ease and facility with which new squares can be inserted render them well worthy the attention of all who are interested in public lighting. We use them at every opportunity, and consider that their advantages only require to be known to be appreciated. (Signed) JAMES WATSON,
Kingston Gaslight and Coke Company, Feb. 5, 1870. **Engineer.**

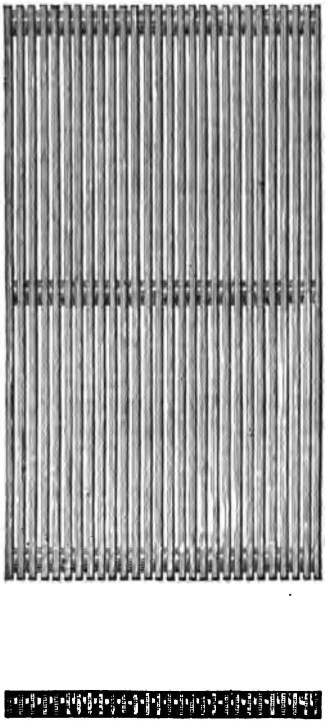
For particulars of price, &c., apply to

BRACE, BRACE, & CO., 11, RED LION COURT,
FLEET STREET, LONDON.

C. & W. WALKER'S
WOOD SIEVES FOR PURIFIERS.



No. 1.



No. 2.

These justly celebrated Sieves, with bevel bars and hard wood side frames, jointed with strong wrought-iron screwed bolts, have been extensively made by Messrs. Walker for over eight years, and their advantages and durability are fully established. Messrs. Walker make them in very large quantities, having mills and machinery laid out for them, producing them at the most moderate cost.

Drawing No. 1 is the best, and most firm and durable kind of Wood Sieves, *bevel* in section, for larger area of Gas Passage through them.

Drawing No. 2 is the second quality, of a less substantial and cheaper kind, and parallel in section.

MIDLAND IRON-WORKS,
DONNINGTON, NEAR NEWPORT, SHROPSHIRE;
8, FINSBURY CIRCUS, LONDON, E.C.

B. CARPENTER'S
IMPROVED WOOD SIEVES for GAS PURIFIERS.

Works:—14, JOHN STREET, PENTONVILLE ROAD,
LONDON, N.

The above Sieves are used by the principal Gas Companies in London and the Country. Their utility, durability, and cheapness combined render them superior to all others.

Testimonials from Gas Engineers who have tested their qualities forwarded on application.

All Orders punctually atteuded to, and Estimates given if required.

LEONI'S

PATENT PORTABLE ATMOSPHERIC

HEATING AND COOKING GAS STOVES,

FOR

BROILING, GRILLING, ROASTING, AND BAKING

BY REFLECTION ONLY,

ARE THE MOST ECONOMICAL AND MOST EFFECTIVE OF ANY STOVES EXTANT.

A complete Dinner for Twelve Persons can be Cooked with a Consumption of only 15 feet of Gas in less than Two Hours.

SHOULD BE SEEN BY ALL PERSONS.

The HEATING STOVE emits no smell, and distributes the warm air uniformly; a great number actually in use in Churches, Halls, Schools, Hospitals Counting-houses, Conservatories, &c. It is the only Gas Apparatus which can be used in Greenhouses without any detriment to the plants. **Three Prize Medals and two Honourable Mentions** were awarded to Mr. LEONI at the International Exhibitions of 1862 and 1867; also First Prize Medal of 1869, from the Cornwall Royal Polytechnic Institution.

LEONI'S PATENT AUTOMATIC ATMOSPHERIC GAS APPARATUS, for Roasting, Baking, &c. A Joint of 6 lbs. roasted in 1 hour, consumption of gas 20 feet (cost less than 1d.); 10 lbs. in 1½ hour; 20 lbs. in 2 hours. Four quartern loaves of bread baked in one hour. Joints, Poultry, Game, &c., all done to the greatest perfection; the loss in weight is by far less than by any other existing system, the juice of the meat being altogether retained, and therefore a most succulent viand, without any loss of its nutriment, is obtained. **References** can be given where these apparatus are in use, from the smallest to the largest size; one single apparatus roasting as much as 2 cwt. of meat in 2 hours' time, at an expense of 9d. in gas, and saving as much as 30 to 36 lbs. of meat when compared with other apparatus in use.

LEONI'S PATENT OPEN RANGE, heated with Atmospheric Gas (a perfect *bijou*), requires a very little space, and is quite an adornment to the kitchen. Combined with a Roasting Apparatus, it will enable the purchaser to do all the cooking for any number of persons up to 50. It is the most economical, the cleanest, **safest**, and most agreeable system ever introduced to the notice of the public. It is easily handled and understood by the most inexperienced person, is portable, and no part can get out of order, and it may be put up ready for use in a few minutes, no fitting or fixing being required beyond the mere connexion to the meter, which is a very considerable saving.

LEONI'S PATENT GAS-BURNERS ensure the completest combustion, are the greatest economizers, and give the largest illuminating power. *Vide* Report made to the Board of Trade by the Referees appointed under the City of London Gas Act, presented to both Houses of Parliament by command of Her Majesty.

LEONI'S STANDARD AND ALBERT BURNERS are equal to 100 illuminating power; **LEONI'S ECONOMIZER to 89·5**; whilst the ordinary Burners in use produce only 23 to 55 per cent. illuminating power compared with the former. Reports under the direction of the Lords of the Council of the Paris Exhibition state similar results.

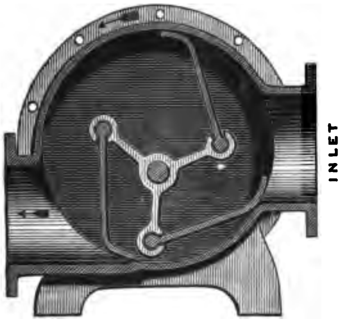
LEONI'S LATEST IMPROVEMENT: his new Capped Burners, with Patent Stoppers, for regulating consumption at any pressure; 4, 5, 6, 8, 9, 10 feet of gas, at pressures from 5/10ths to 15/10ths; highest illuminating power yet obtained, 100 per cent. (equal to the standard). **6s. per dozen.**

LEONI'S ADAMAS TAPS AND STOP-COCKS, for bottling Beer, Wine, Alkalies, and strong Acids, are non-corrosive, most durable, always clean, and will not leak. They are made to lock with a very small key, and cannot be tampered with.

Illustrated Prospectus with Prices sent on application.

S. LEONI, ADAMAS WORKS,
34, St. Paul Street, New North Road, London, N.

CHARLES HORSLEY'S



PATENT

GAS EXHAUSTER.

ALSO

ROTARY TAR

AND

OIL PUMPS.

Engines and Boilers supplied to drive the same.

For Particulars and Prices apply to the Patentee,

22, WHARF ROAD, CITY ROAD, LONDON, N.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 20 & 22, Wharf Road, City Road,

LONDON, N.,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, promptly executed.—Estimates given.

CHARLES HORSLEY, Agent.

HANCOCK'S

INDIA-RUBBER GAS-TUBING,

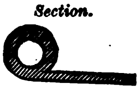
ALL SIZES, FROM ⅛ IN. TO 4 IN. DIAMETER & UPWARDS;

ALSO

HORSE SINGEING APPARATUS,

BEST MAKE, WITH GAS-BURNERS, COMBS, AND INDIA-RUBBER TUBING,
ALL COMPLETE.

INDIA-RUBBER BAGS for GAS-MAINS.
WASHERS for GAS and STEAM JOINTS.
VALVES (pure solid Rubber) for STEAM-ENGINES.
PACKING (Elastic) for STEAM-ENGINES.
FLANGE TUBING for excluding Draughts and Dust through WINDOWS, DOORS, and GLASS CASES.



HOSE-PIPES, all sizes, & BRASS FITTINGS, for WATERING GARDENS.
AGRICULTURAL and other PUMPS, &c.

Illustrated Price Lists on Application.

JAMES LYNE HANCOCK,

Vulcanized India-Rubber Works,

GOSWELL MEWS, AND 266, GOSWELL ROAD, LONDON, E.C.

PRICE'S PATENT COKE & COAL BARROW,

Effecting a great saving of Time, Labour, and Expense.

For Particulars, Price, &c.,
apply to—

Mr. E. PRICE,
GAS-WORKS,
HAMPTON WICK.

OLD WEMYSS CANNEL COAL.

YIELD OF GAS PER TON, 12,896 CUBIC FEET;
ILLUMINATING POWER, 31·75 STANDARD CANDLES.

For Oil-making, it yields per Ton 68·5 gallons of Crude Oil of most excellent quality.

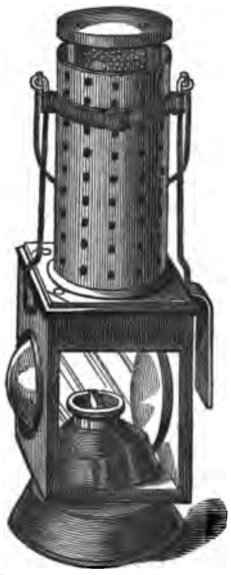
PORT OF SHIPMENT, WEMYSS.

For Price and Analysis, apply to—

WM. CAREY, *Manager*,
WEMYSS COLLIERY, KIRKCALDY, FIFE, N.B.

HENRY BALFOUR & CO.,
DURIE FOUNDRY, LEVEN, FIFE,
AND
6, NEW BROAD STREET, LONDON, E.C.,
MANUFACTURERS OF
SINGLE & TELESCOPE GASHOLDERS,
TANKS, PURIFIERS, CONDENSERS, RETORT-HOUSE ROOFS,
STEAM-ENGINES AND GAS EXHAUSTERS,
And all kinds of Cast and Wrought Iron Work.

HENRY T. BALFOUR,
6, NEW BROAD STREET, LONDON, E.C.,
CONTRACTOR FOR
THE SUPPLY and ERECTION OF TANKS and GASHOLDERS;
STREET MAINS AND GENERAL GAS APPARATUS;
ENGINES, BOILERS, & ALL KINDS of MACHINERY & IRONWORK.
Plans, Specifications, and Estimates furnished on Application.



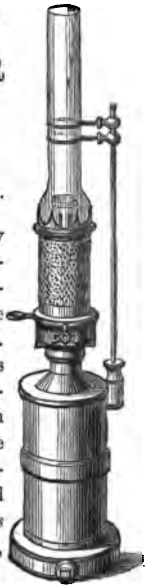
ARMSTRONG'S
SAFETY LAMP
FOR GAS-WORKS,
Or for any purpose where a good light and safety are required.

This lamp has been in use in most of the English and Foreign Gas-Works for many years, giving entire satisfaction.

ADDRESS—
H. ARMSTRONG,
GAS-METER
MANUFACTURER,
GAS AND HOT-WATER
ENGINEER,
43, MANCHESTER STREET,
KING'S CROSS.
Gas-Works for Mansions Erected.

ARMSTRONG'S
PHOTOMETER LAMP,
AS ADAPTED TO
KEATES'S BALANCE.

This lamp, as now arranged, is an improved and more complete form of the one supplied to T. W. Keates, Esq., for his experiments in substituting an oil in place of a candle standard in photometry, as published in the *Journal of Gas Lighting*, March 16, 1869.



PEET'S VALVE TAPS,
(WITH TWO LOOSE DISCS,)
For STEAM, WATER, and GAS.
Patented in all European Countries. Thousands in constant use in Europe and America.

These VALVE TAPS are admitted to be the best ever used. They may be had either in Gun Metal or Cast Iron, all sizes, with m. or f. ends, screwed for w.i. pipe, or with flanges, bib, or union joint attached.

The Engineering Press on both sides of the Atlantic give the preference to the improved construction, excellence of material, and superior workmanship of PEET'S VALVES over all others.

Hundreds of Testimonials may be seen on application.

Supplied by all the principal Factors, Brassfounders, Shippers, Engineers, and Mill Furnishers in Europe.

SOLE MAKERS, WHITLEY PARTNERS, RAILWAY WORKS, LEEDS.

C. & W. WALKER,

ENGINEERS AND IRONFOUNDERS,

Midland Iron-Works,

DONNINGTON, near NEWPORT, SHROPSHIRE,

MANUFACTURE AND ERECT

GASHOLDERS, TELESCOPE AND SINGLE-LIFT;

GASHOLDER TANKS OF CAST AND WROUGHT IRON;

PURIFIERS, CONDENSERS, SCRUBBERS, & ROOFS

AND EVERYTHING USED IN GAS-WORKS.

These Works being occupied in the construction of Gas Engineering work exclusively, the system of manufacture is thereby improved and developed, and brought to a very high degree of excellence.

The Gasholder work is largely made by machinery of the most advanced kind, by which not only soundness, but a superior finish is attained, the columns of the largest diameters being cast, fitted, and finished upon the Works.

Purifiers and Patent Centre-Valves.

C. & W. Walker also ask the attention of Gas Companies to the important improvements they have effected in the construction of Purifiers, during the past few years, in all their *working parts* and *arrangements*, enabling *one man* upon a Gas-Works to do *the work* hitherto done by *three*, with *great economy* in the purifying materials.

This system of Purifiers, worked by C. & W. Walker's Patent Centre-Valve, including Messrs. Cockey's Patent by licence, is now being extensively used by Gas Companies in all parts of the world, and possesses advantages of the highest importance.

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